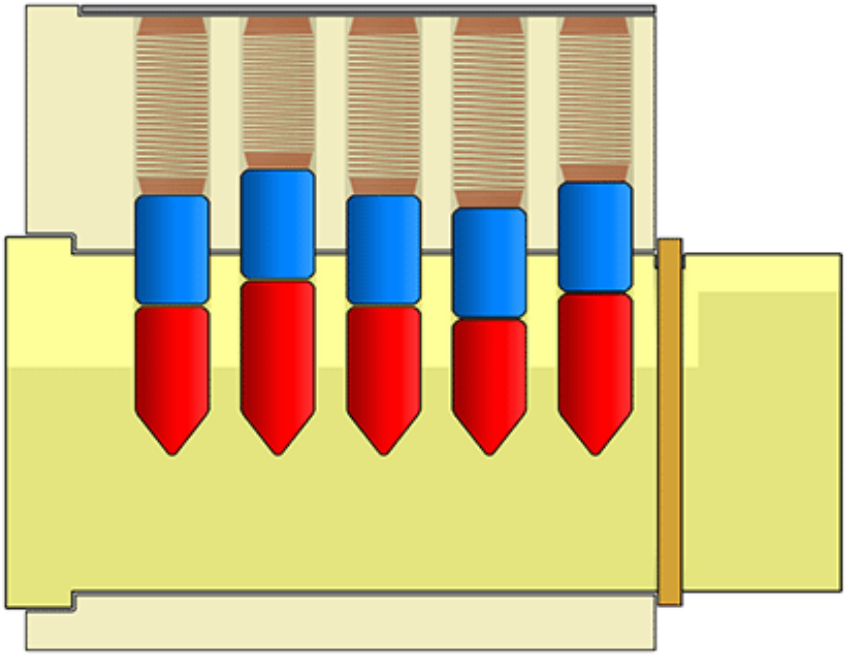
Lockpick



Pins

Wafers

Combo

Resist

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Bumpi

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Impres

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Master

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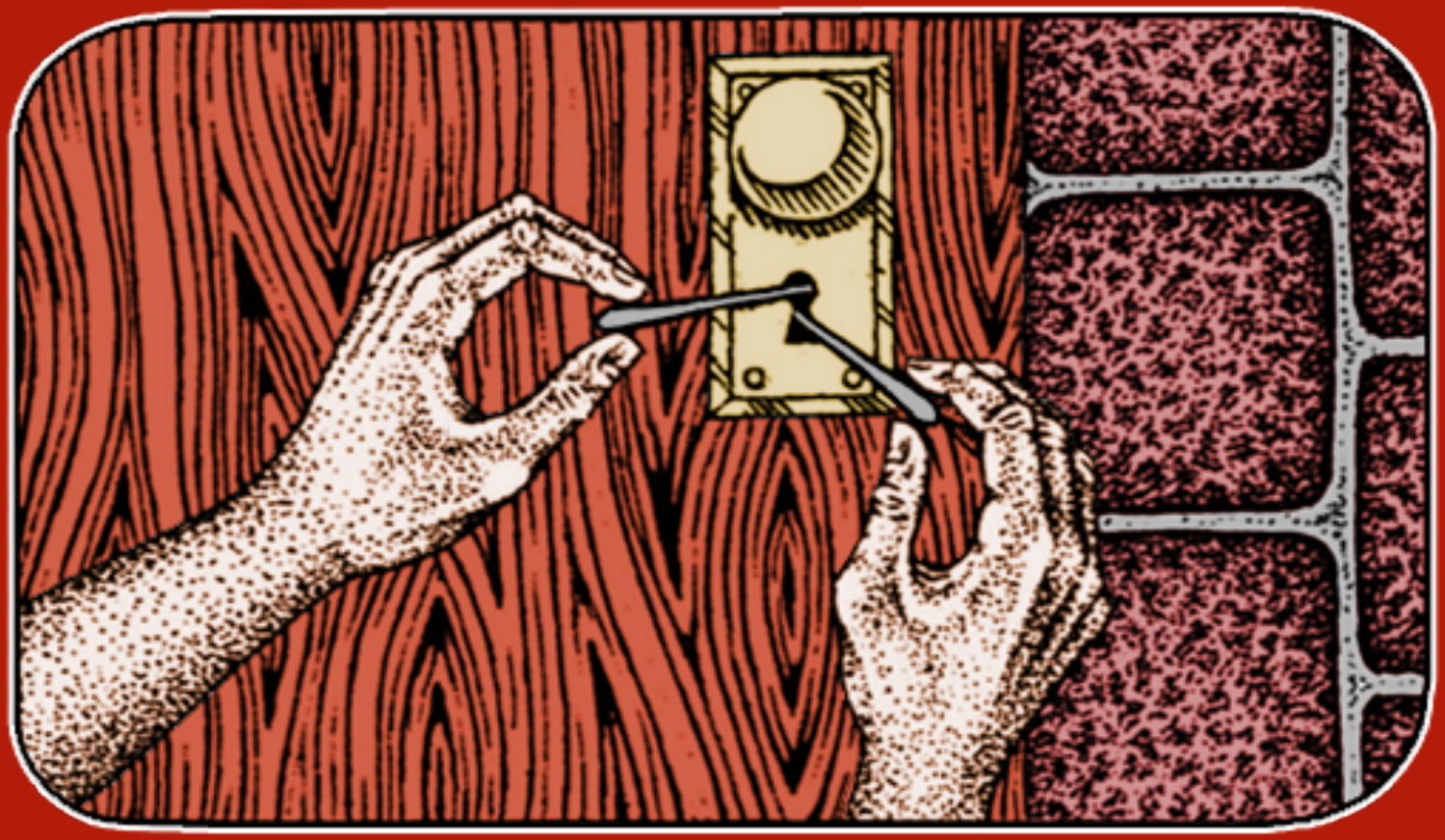
Picks

TOOL

The Open Organisation Of Lockpickers

Why do Locks Matter?



Locks Hold a Special Place in Our Lives

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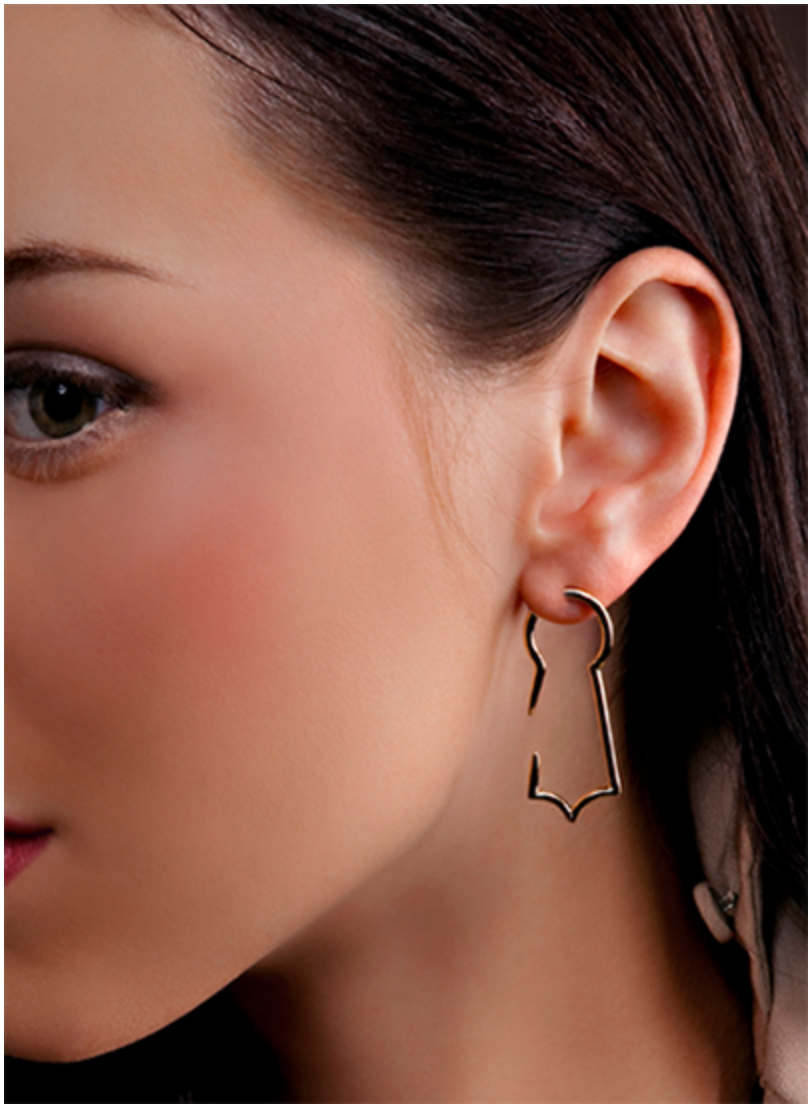

“What Does a Lock Signify?” (Schuyler Towne at RVAsec 2013)

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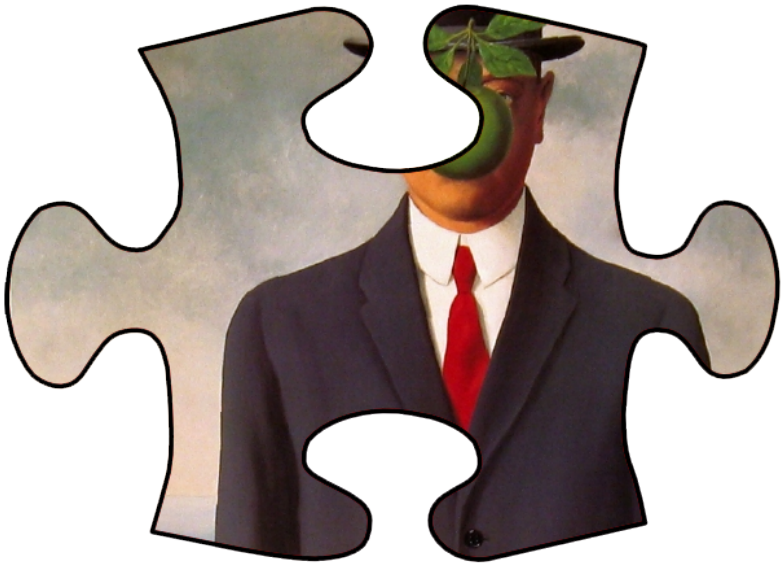
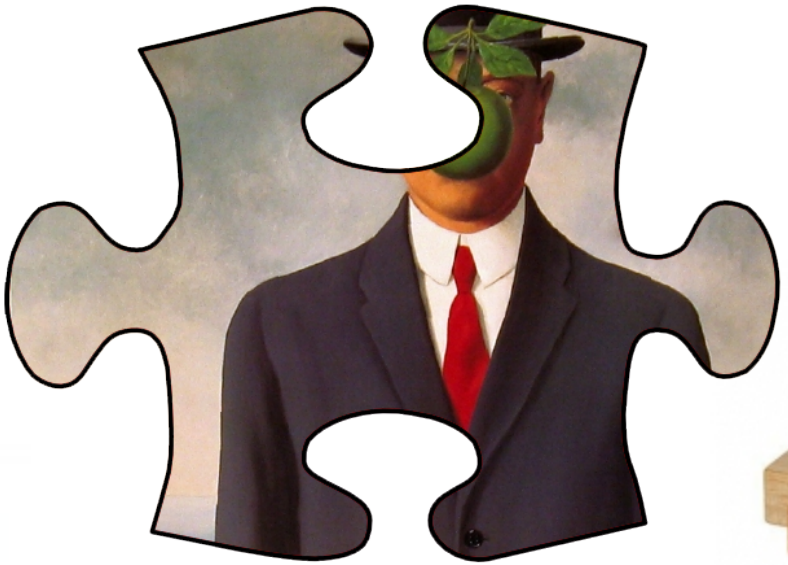
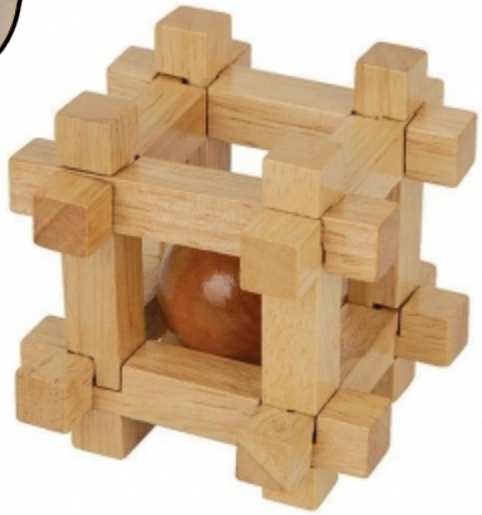
Puzzles

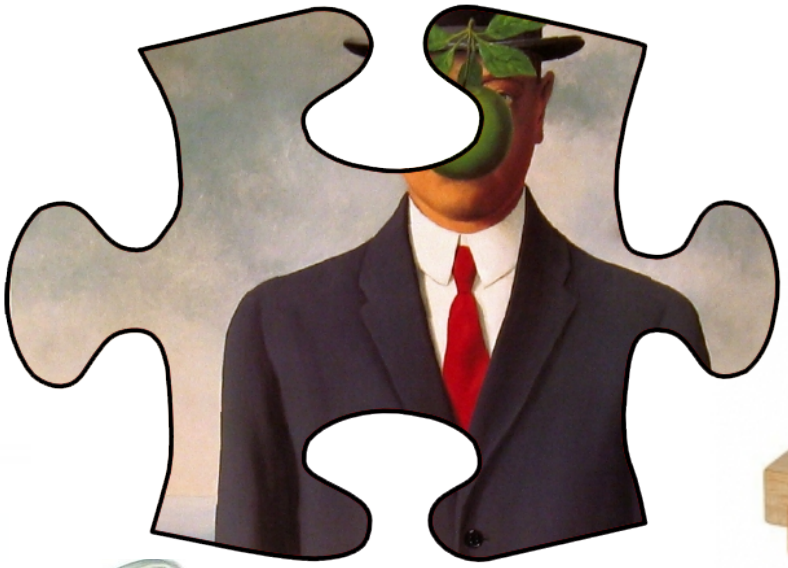


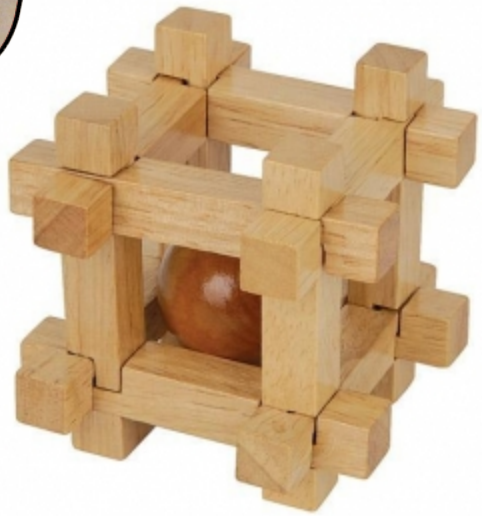
Puzzles





Puzzles





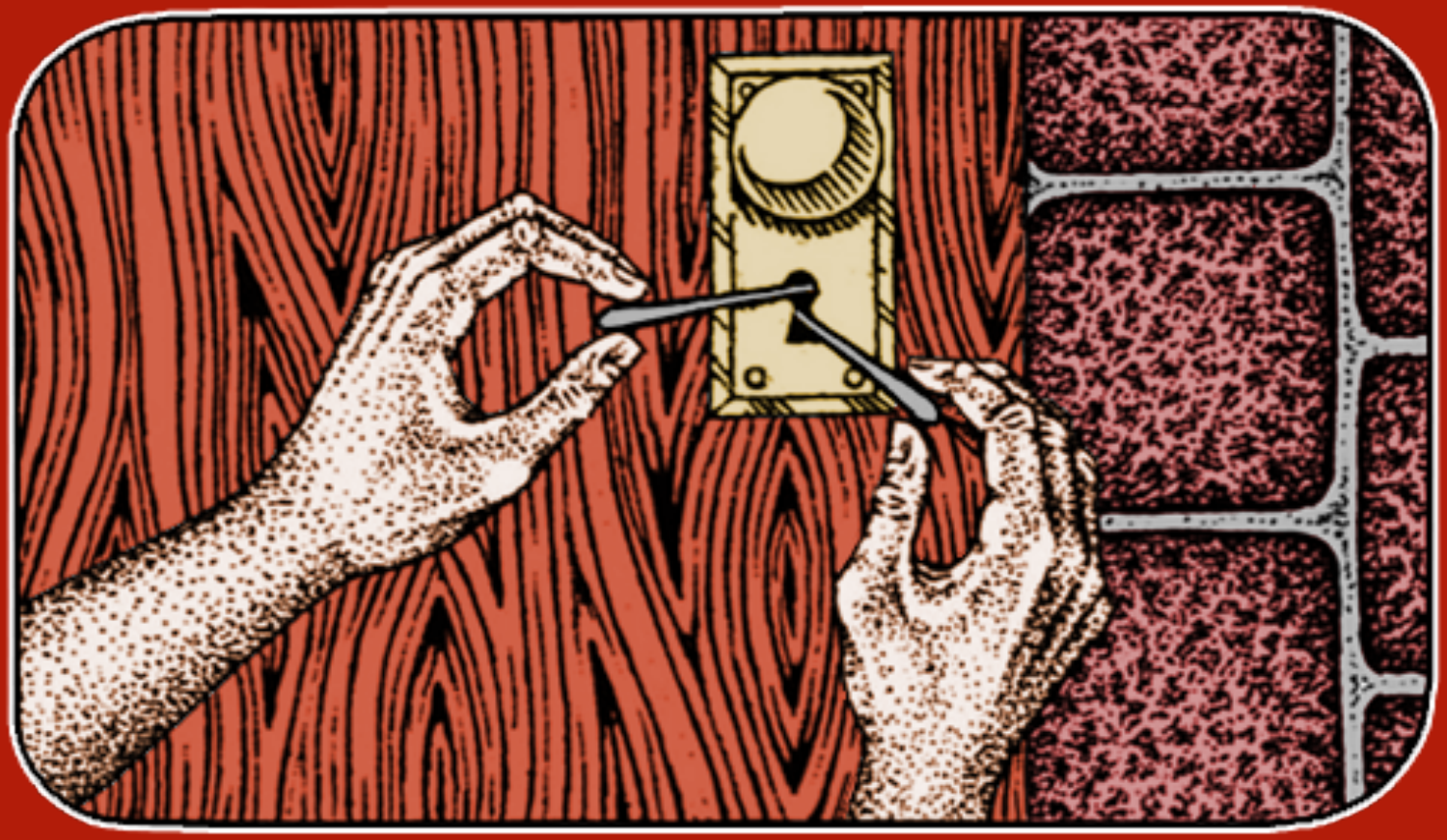
Lockpicking is fun puzzle solving for us

Try your hand at Lockpicking Games…

… Win Fabulous Prizes and Become Famous!

The Competition Can Get Serious

Intro to Lockpicking



First, a word about rules…

Yes, we have rules. ☺

1. Do not pick locks which you do not own.

2. Do not pick locks upon which you rely.

The Three Kinds of Lock-Opening

The Three Kinds of Lock-Opening

1.Lockpicking

The Three Kinds of Lock-Opening

1. Lockpicking

2. Quick & Dirty

The Three Kinds of Lock-Opening

1. Lockpicking

2. Quick & Dirty

3. Covert & High-Tech

The Three Kinds of Lock-Opening

1. **Lockpicking** – what we do

2. **Quick & Dirty** – what criminals do

3. **Covert & High-Tech** – what spies do

The Three Kinds of Lock-Opening

1. **Lockpicking** – what we do
   TOOOL provides the knowledge and the means

2. **Quick & Dirty** – what criminals do
   TOOOL provides knowledge. . . but no means

3. **Covert & High-Tech** – what spies do

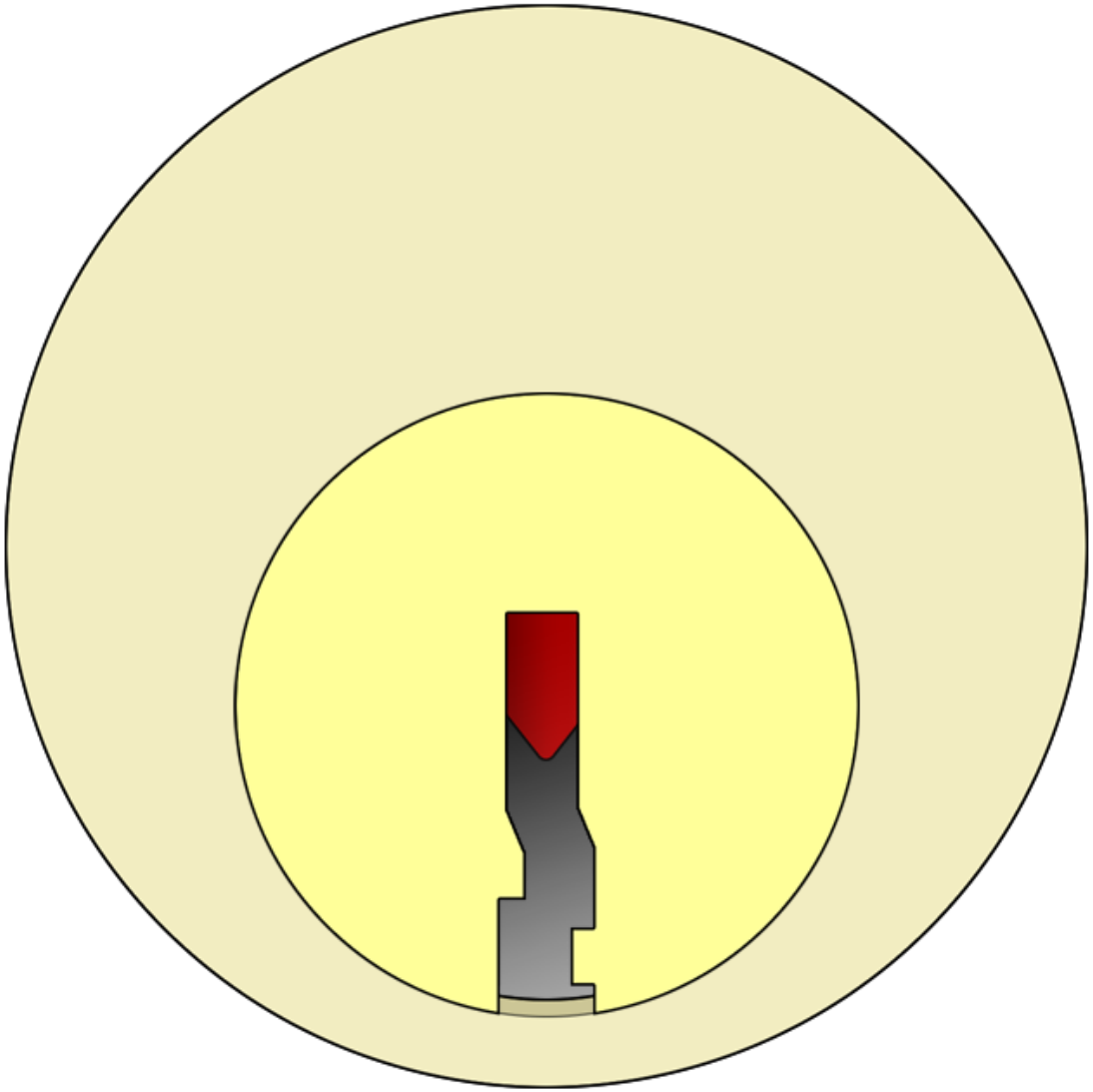
Lockpicking is Easy!

Pin Tumbler Locks

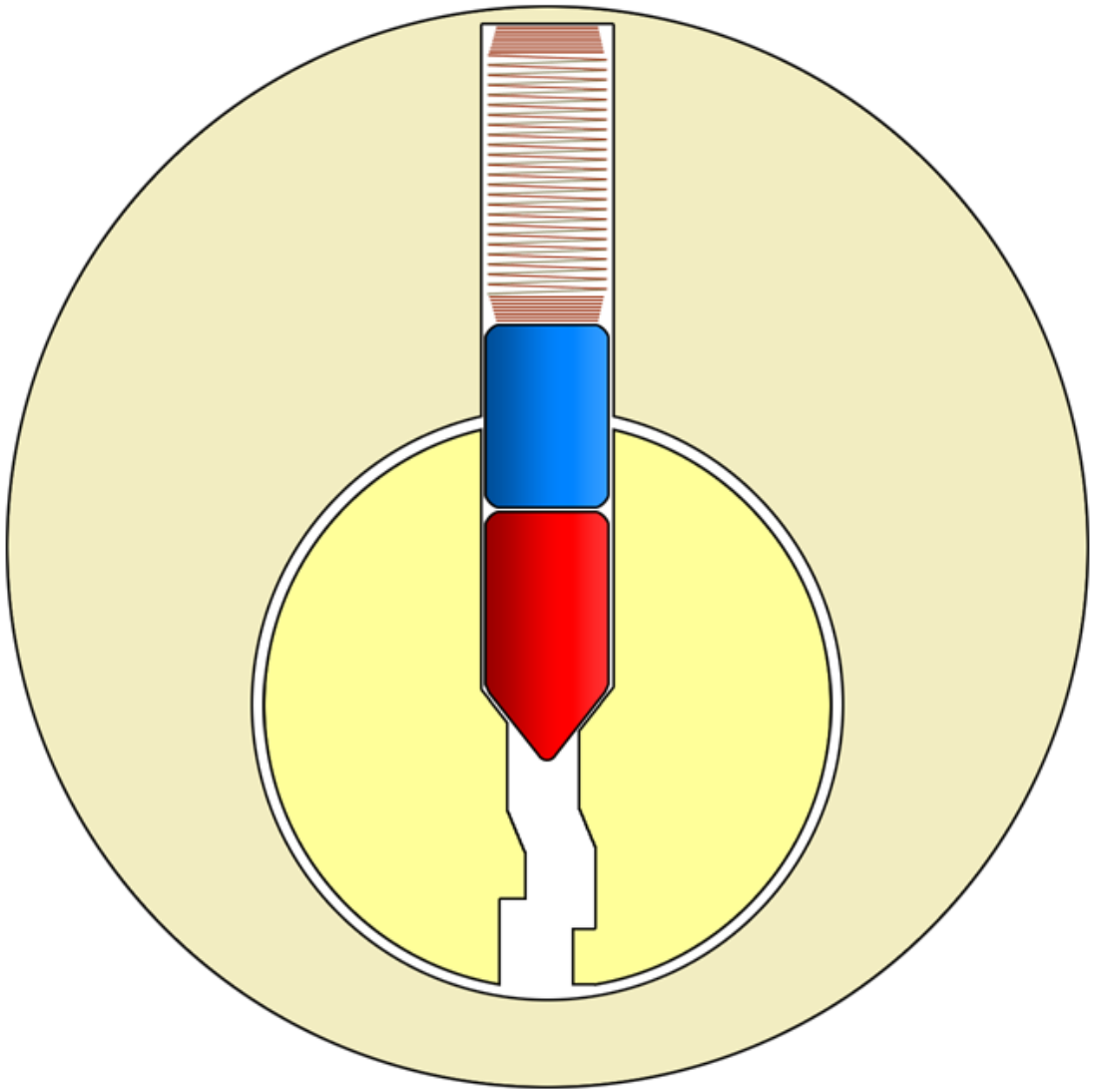
Pin Tumbler Locks

Pin Tumbler Locks

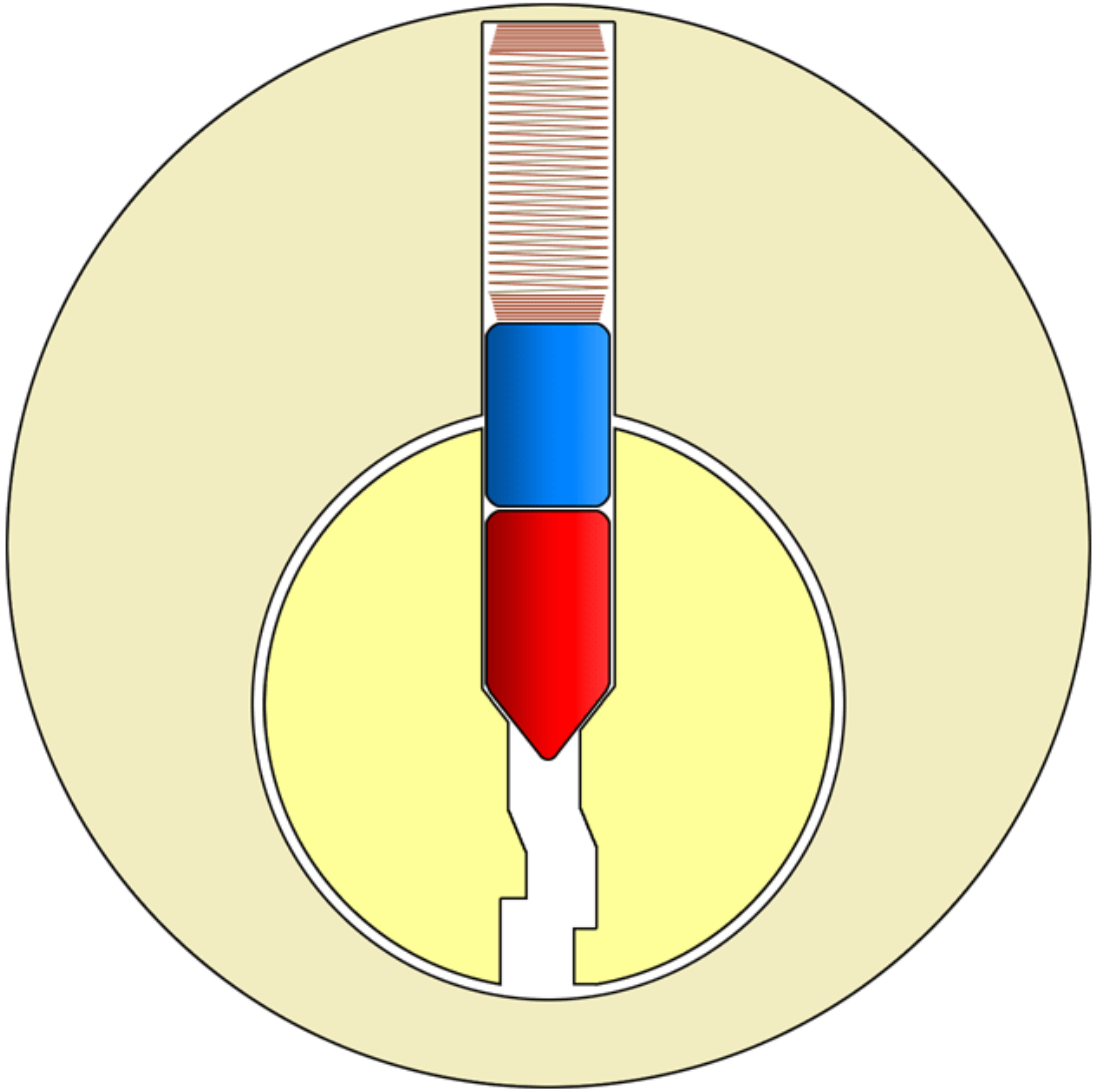
Outer View



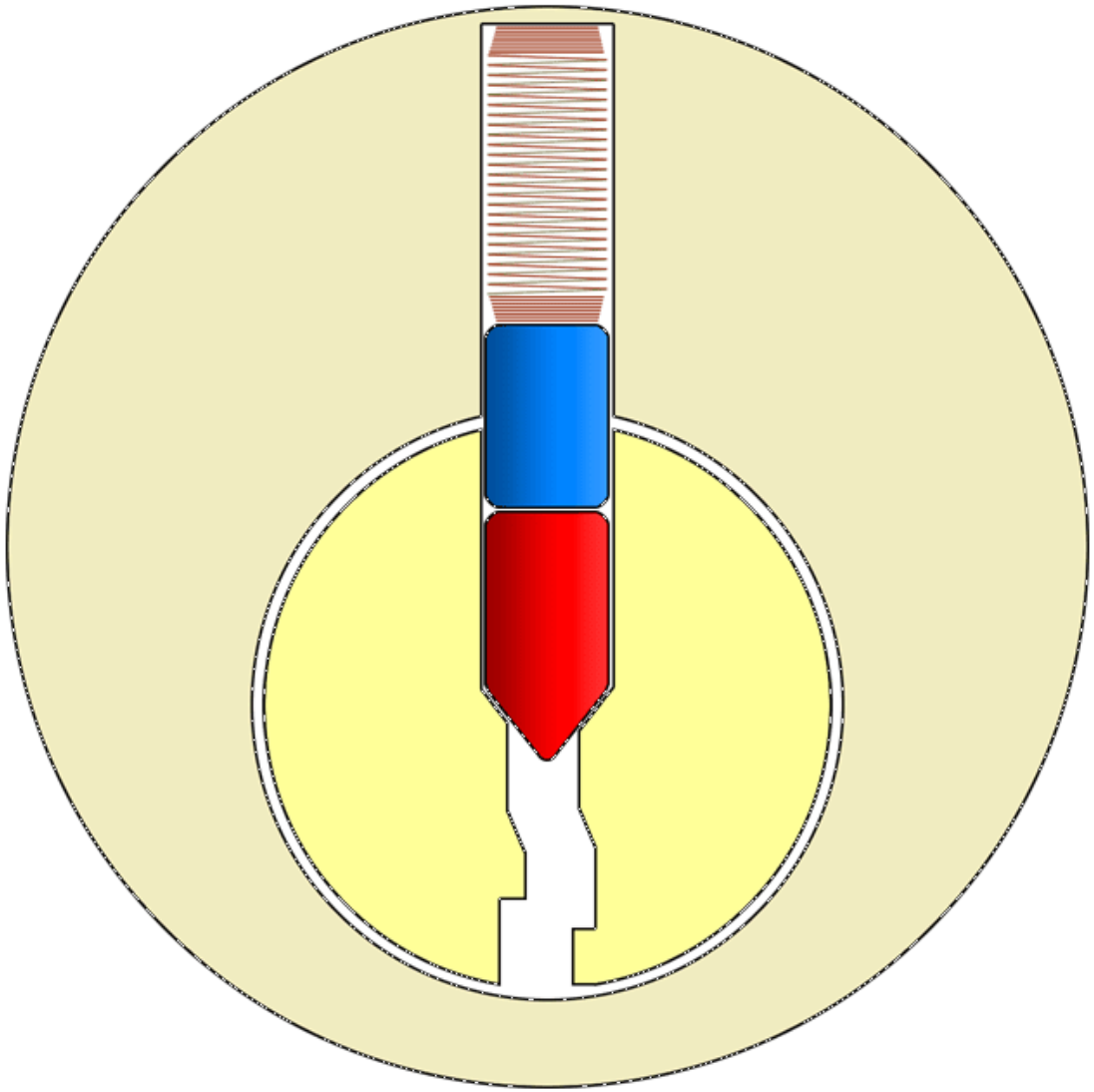
Inner View



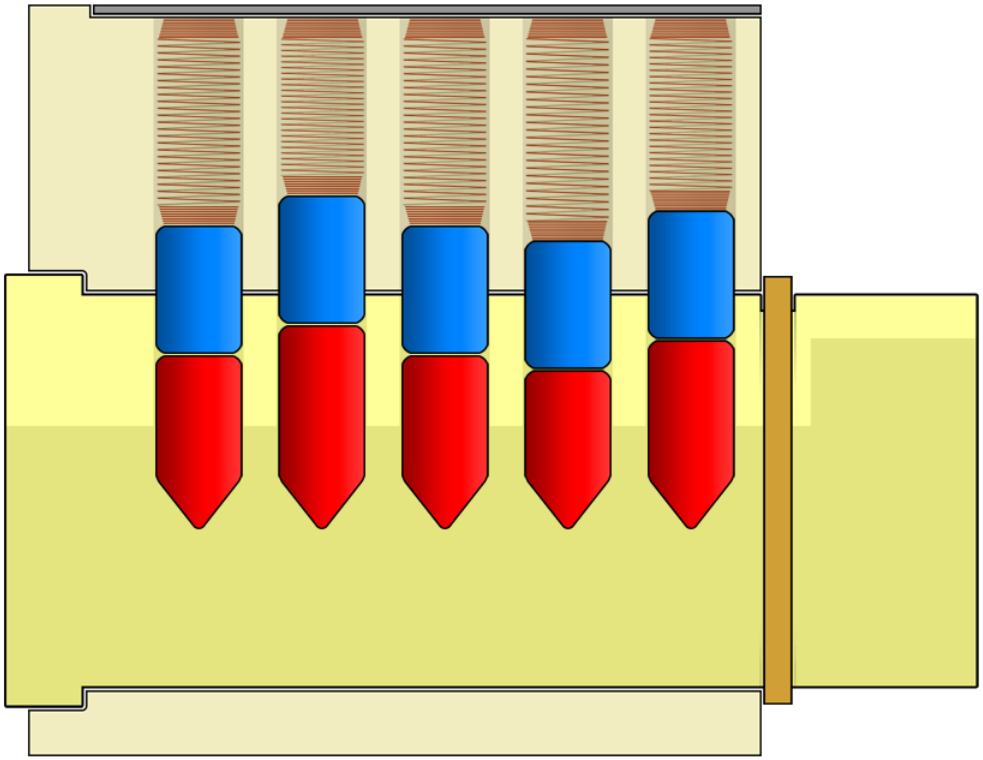
Attempt Without a Key



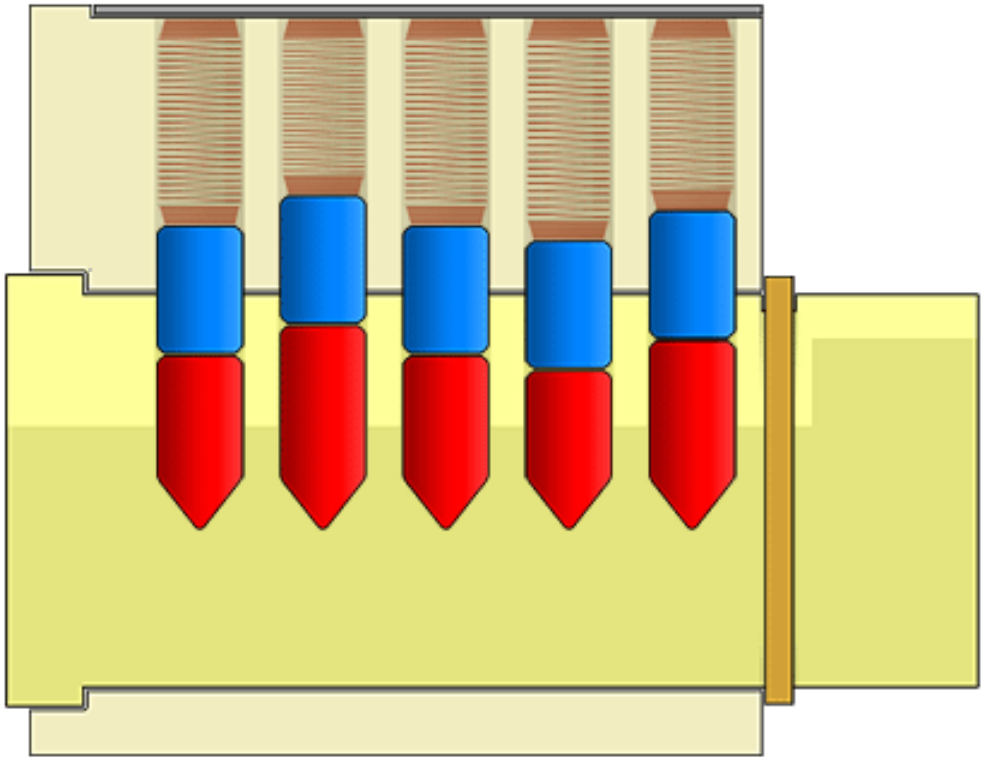
Operating With a Key



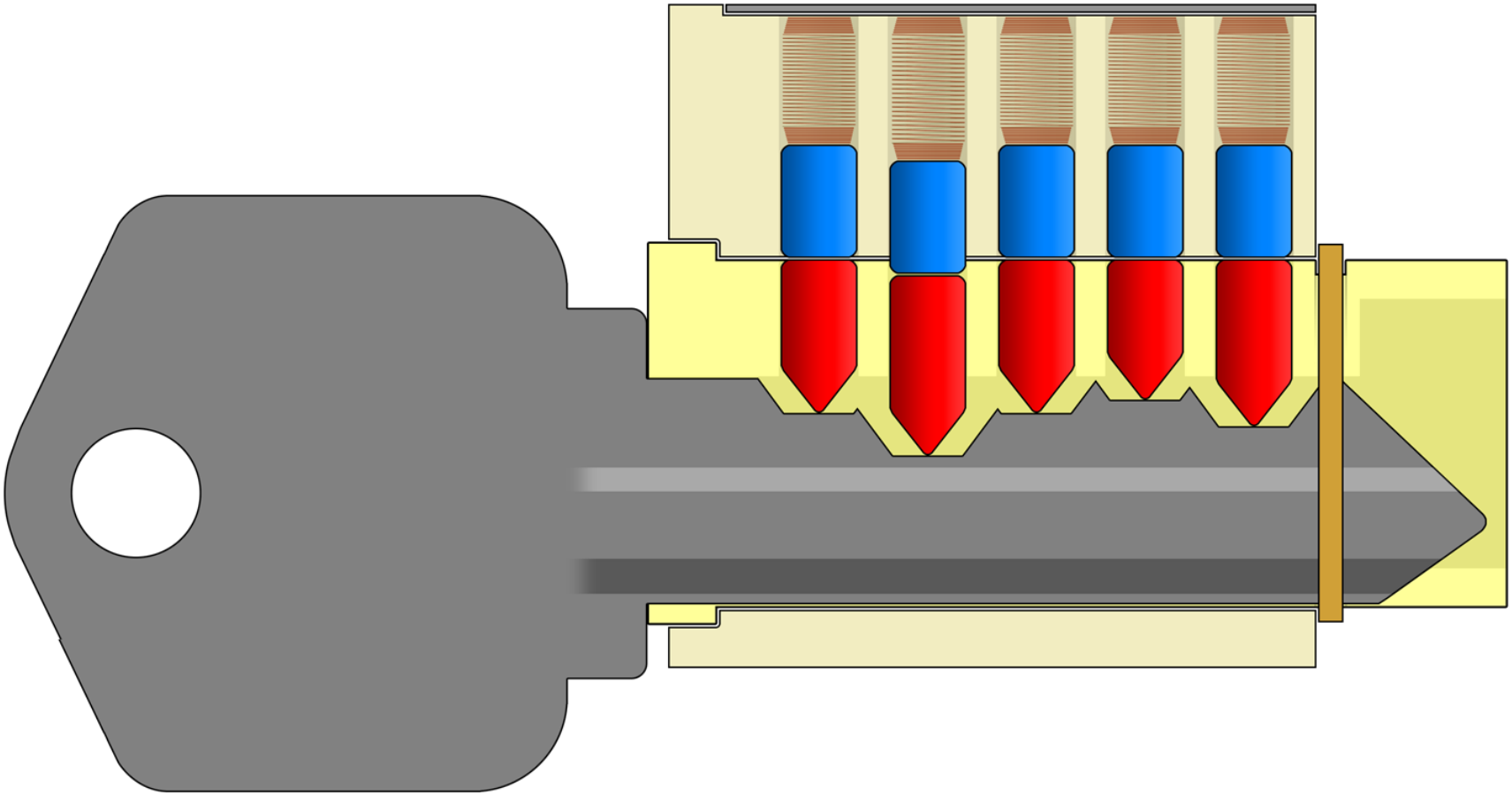
Pin Stacks



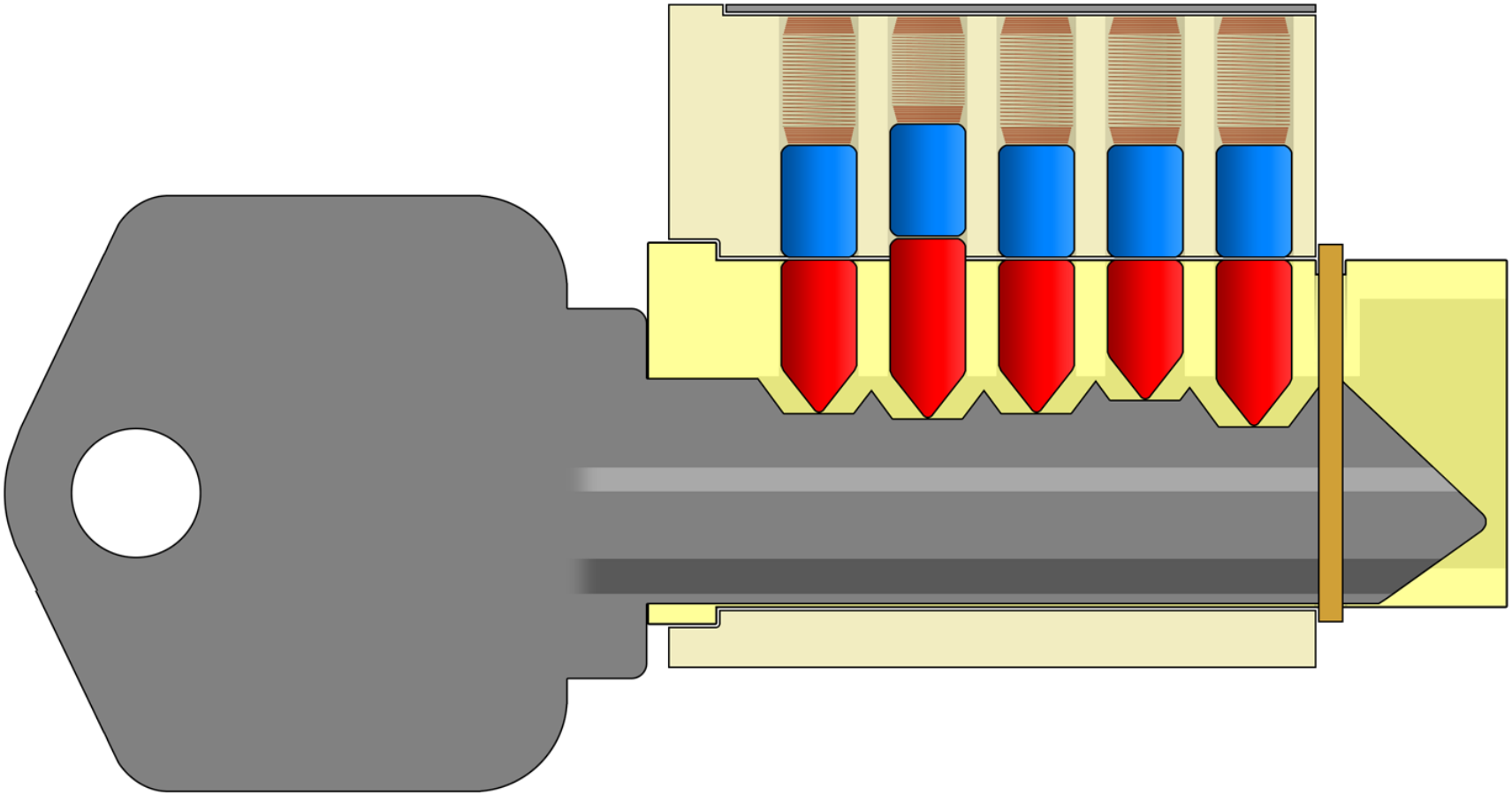
Key Operation



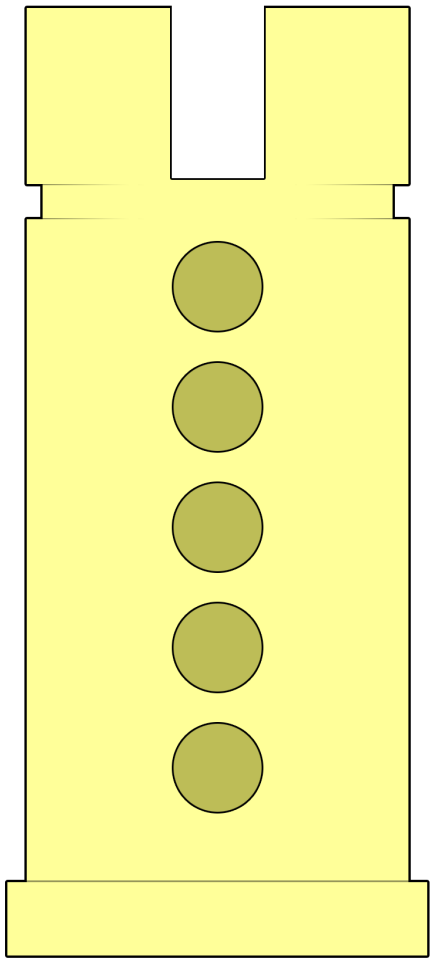
One Bitting Too Low

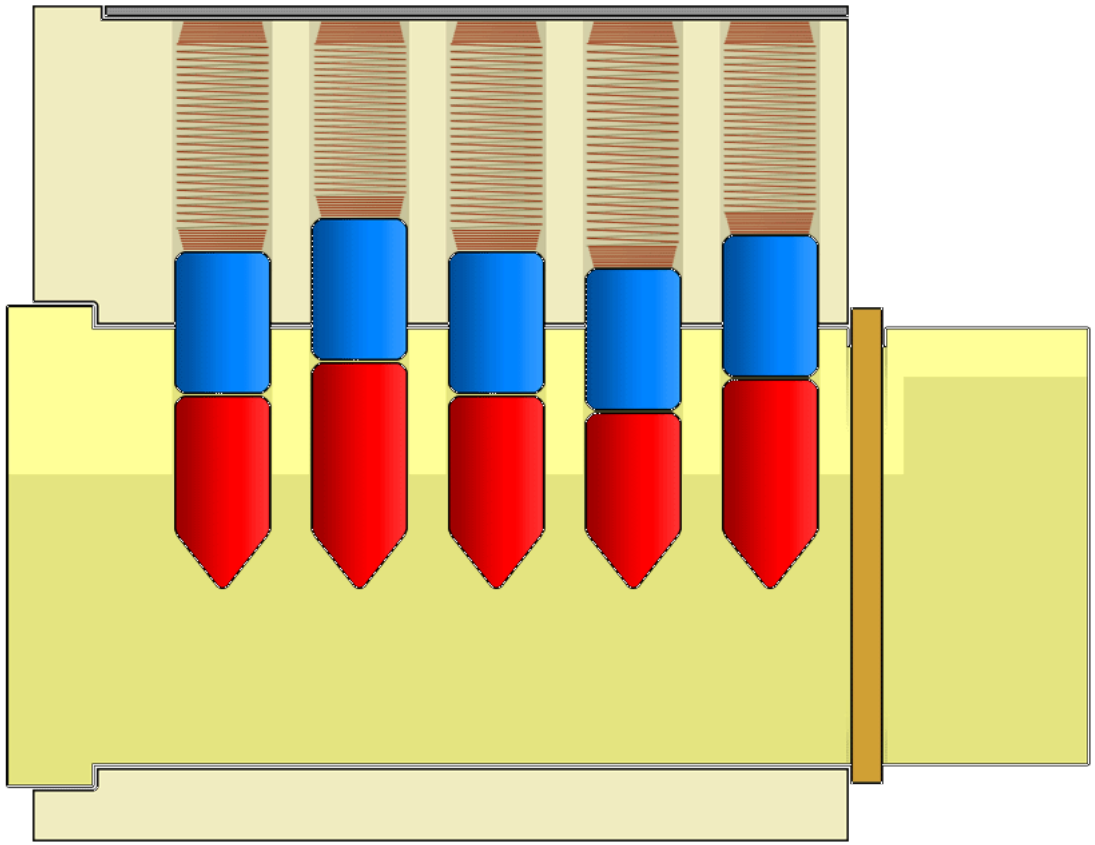


One Bitting Too High

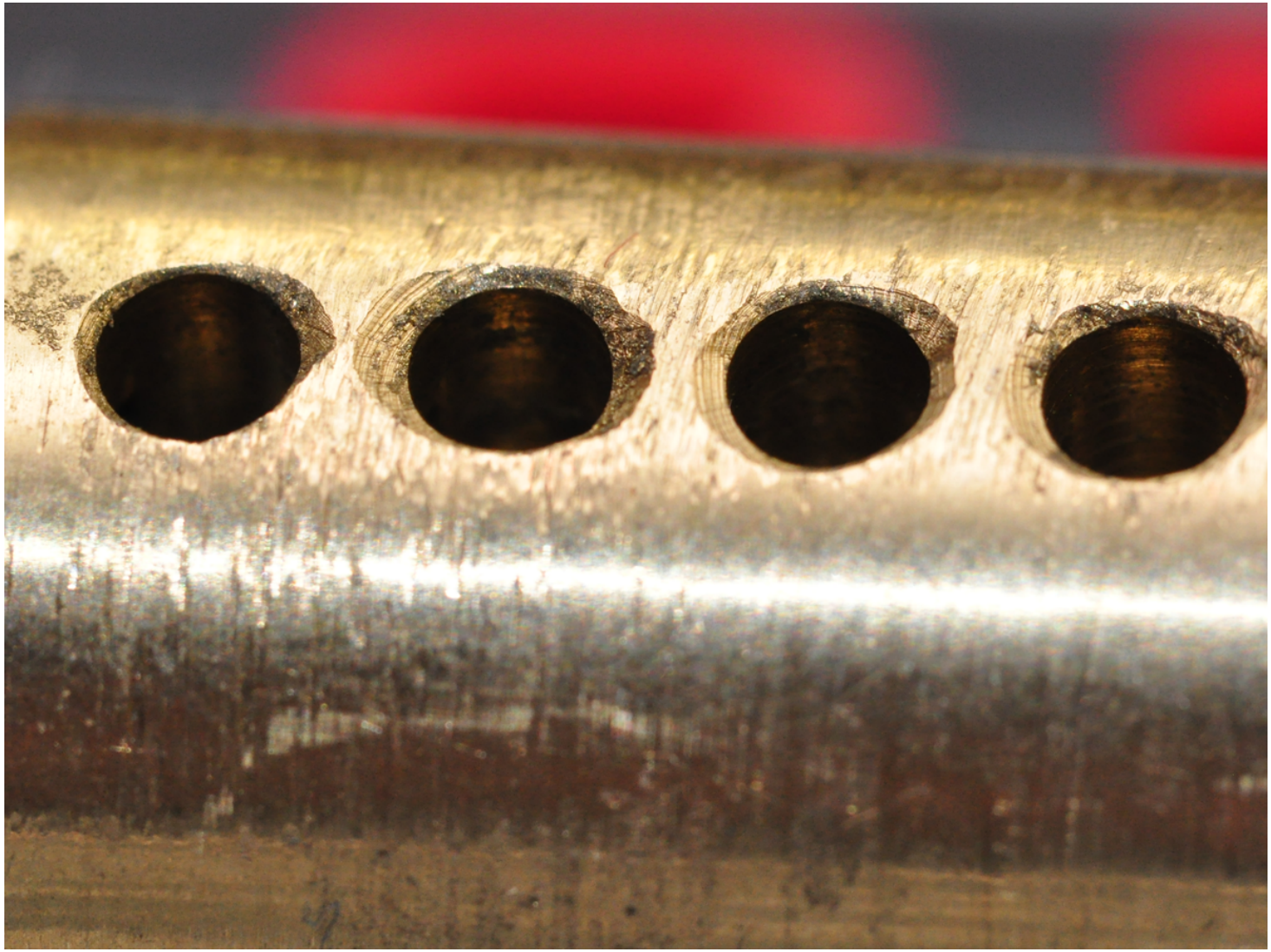


In a Perfect World

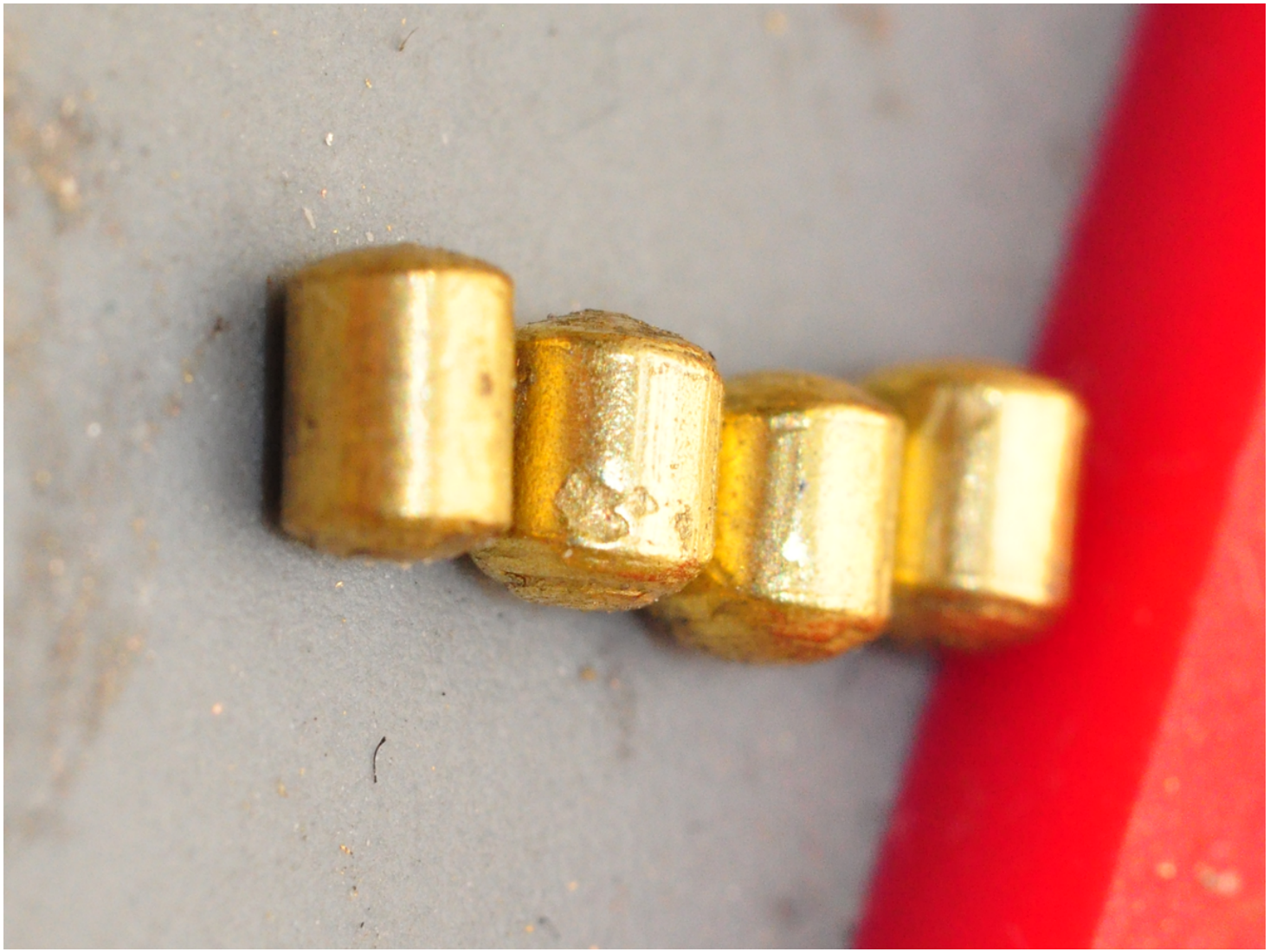




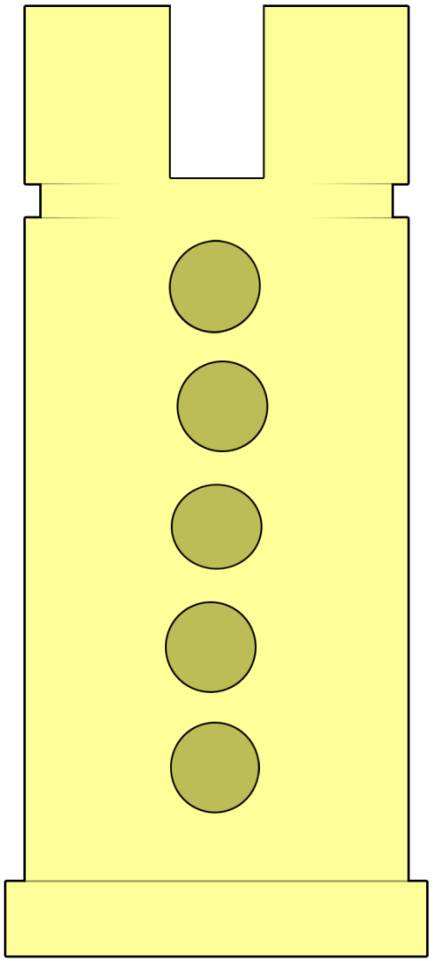
In the Real World

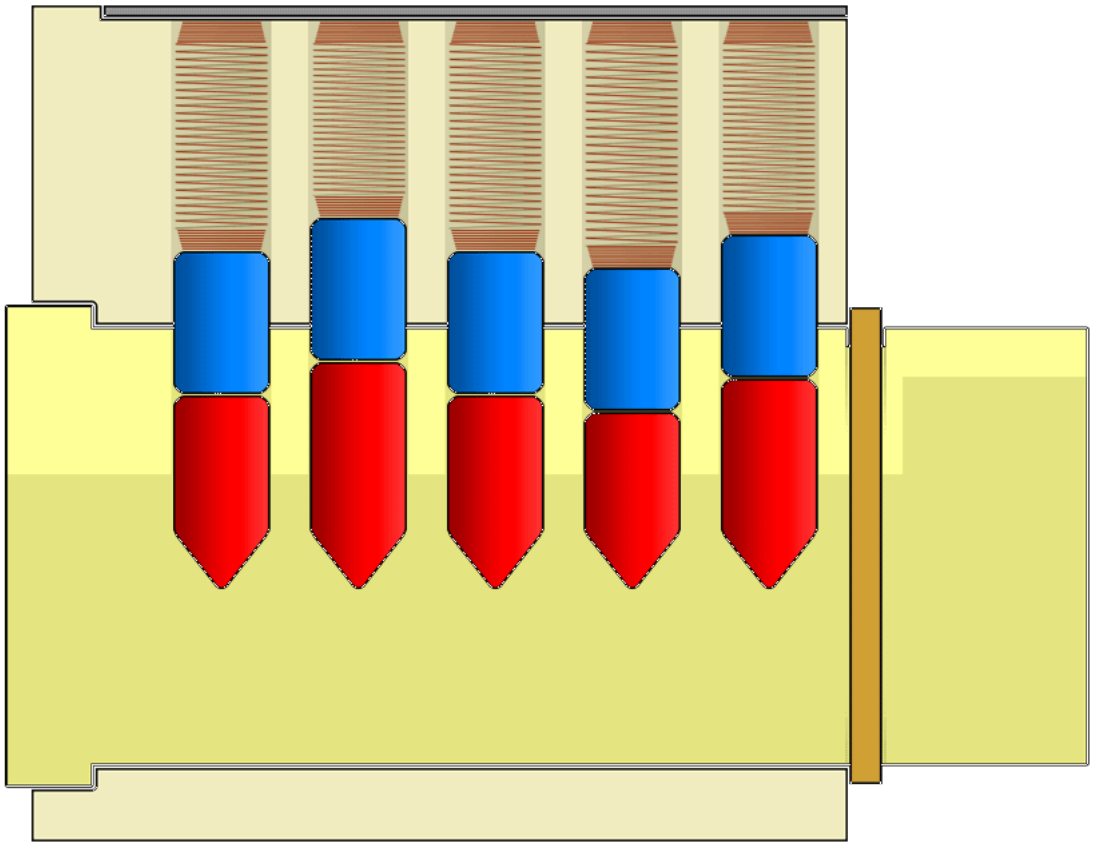


In the Real World

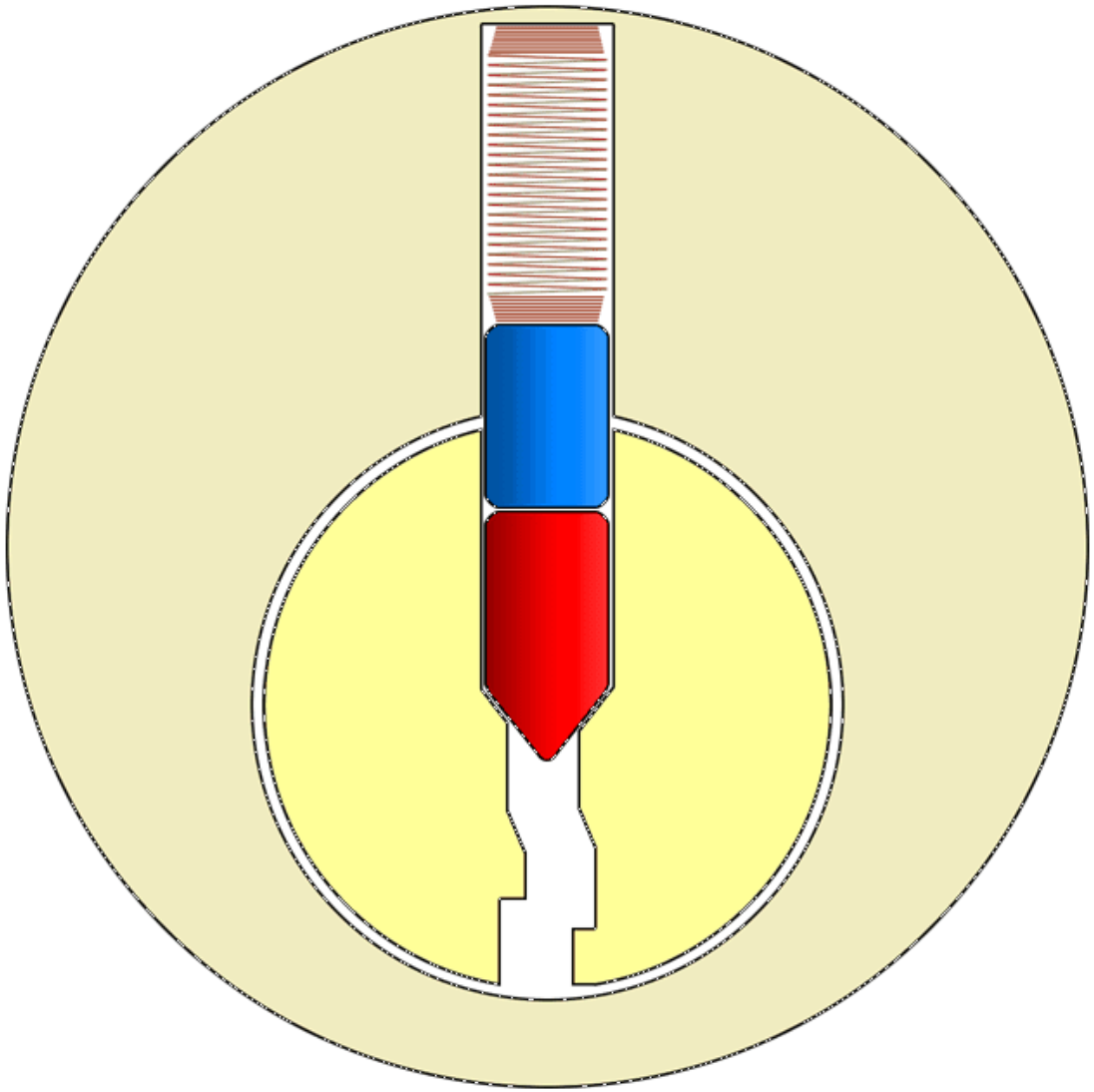


In the Real World

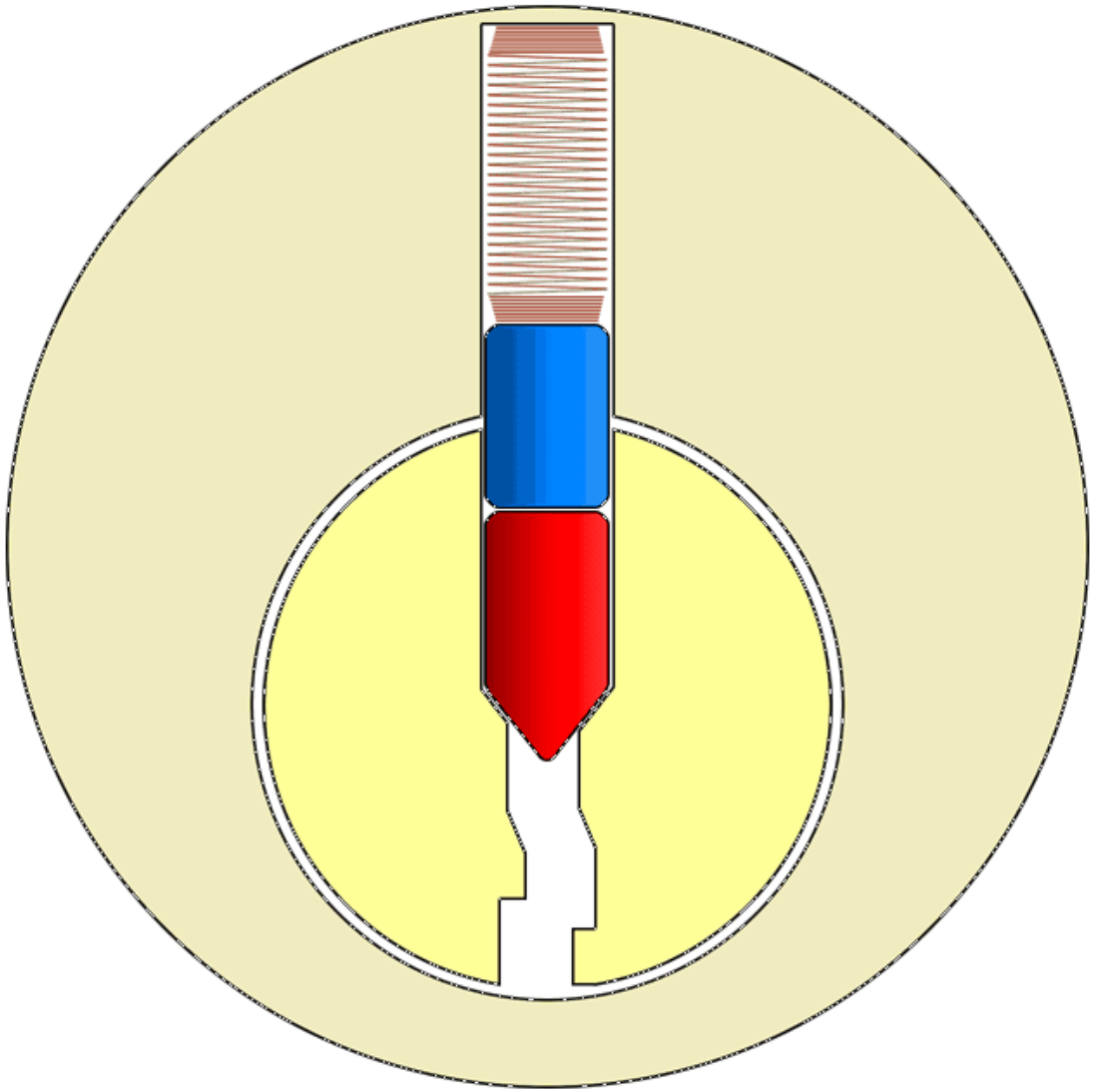




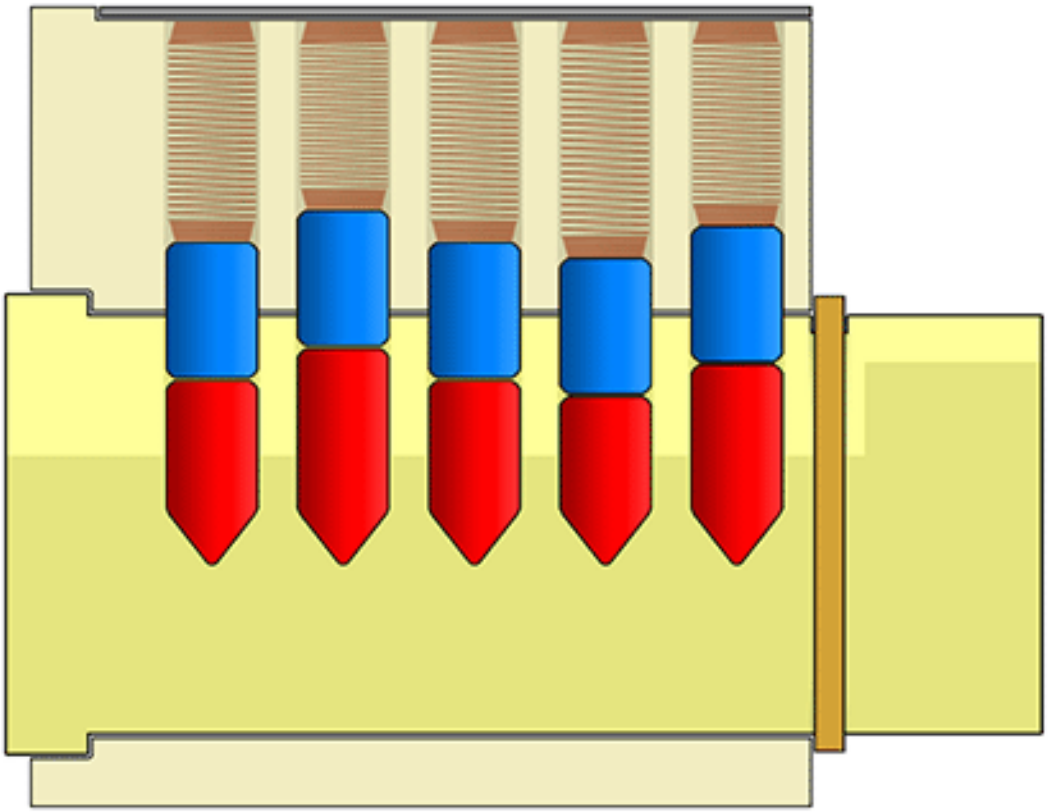
“Setting” a Binding Pin



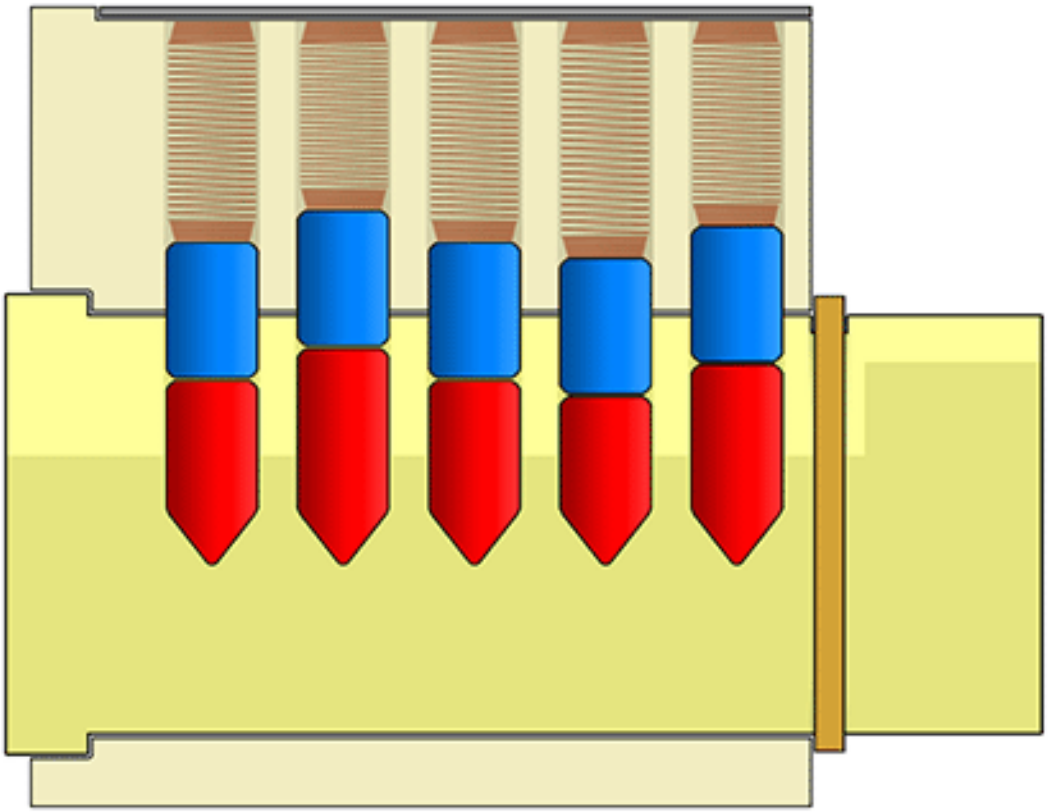
The Key Pin Can Still Move Freely



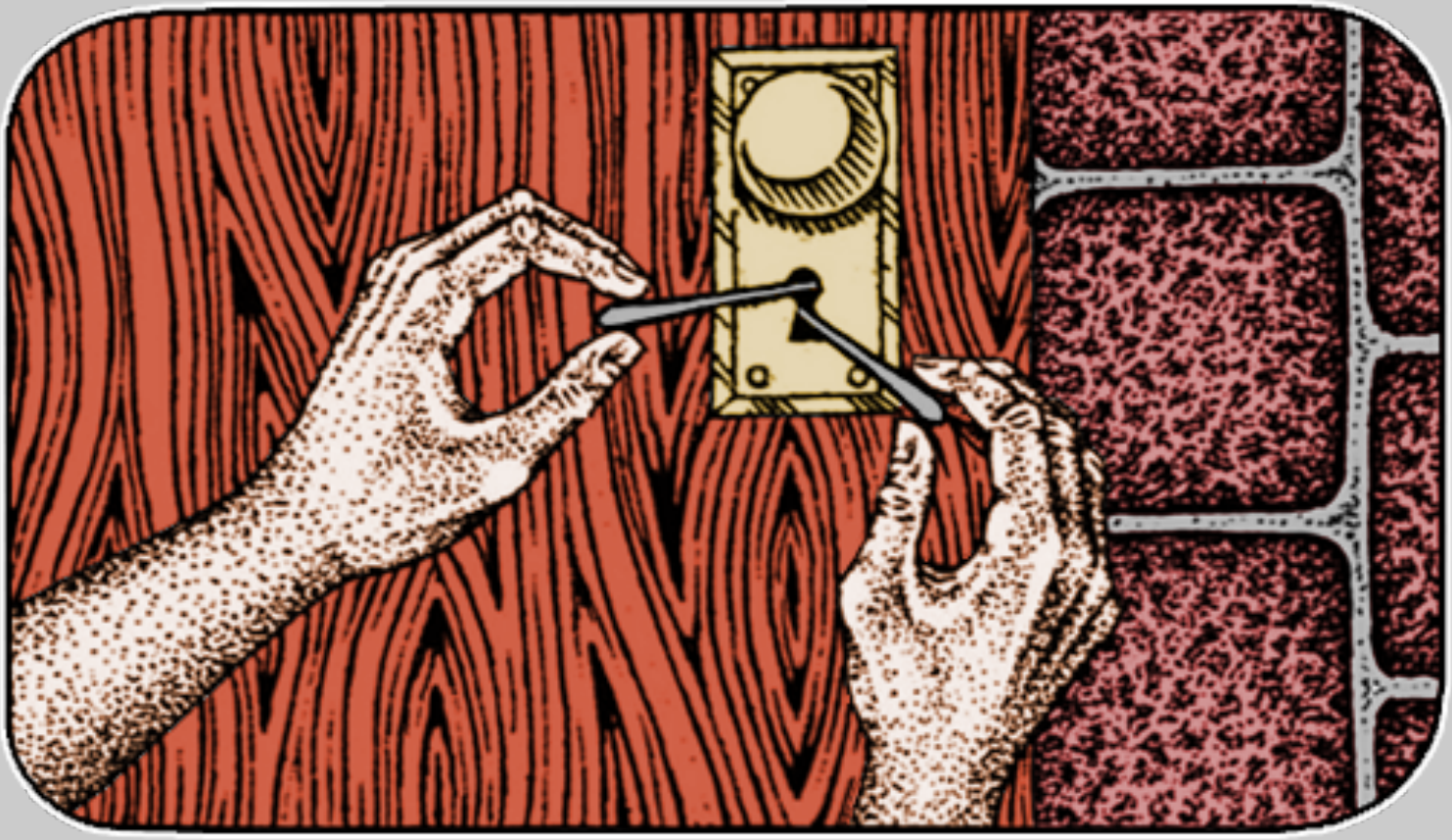
Setting Multiple Pins



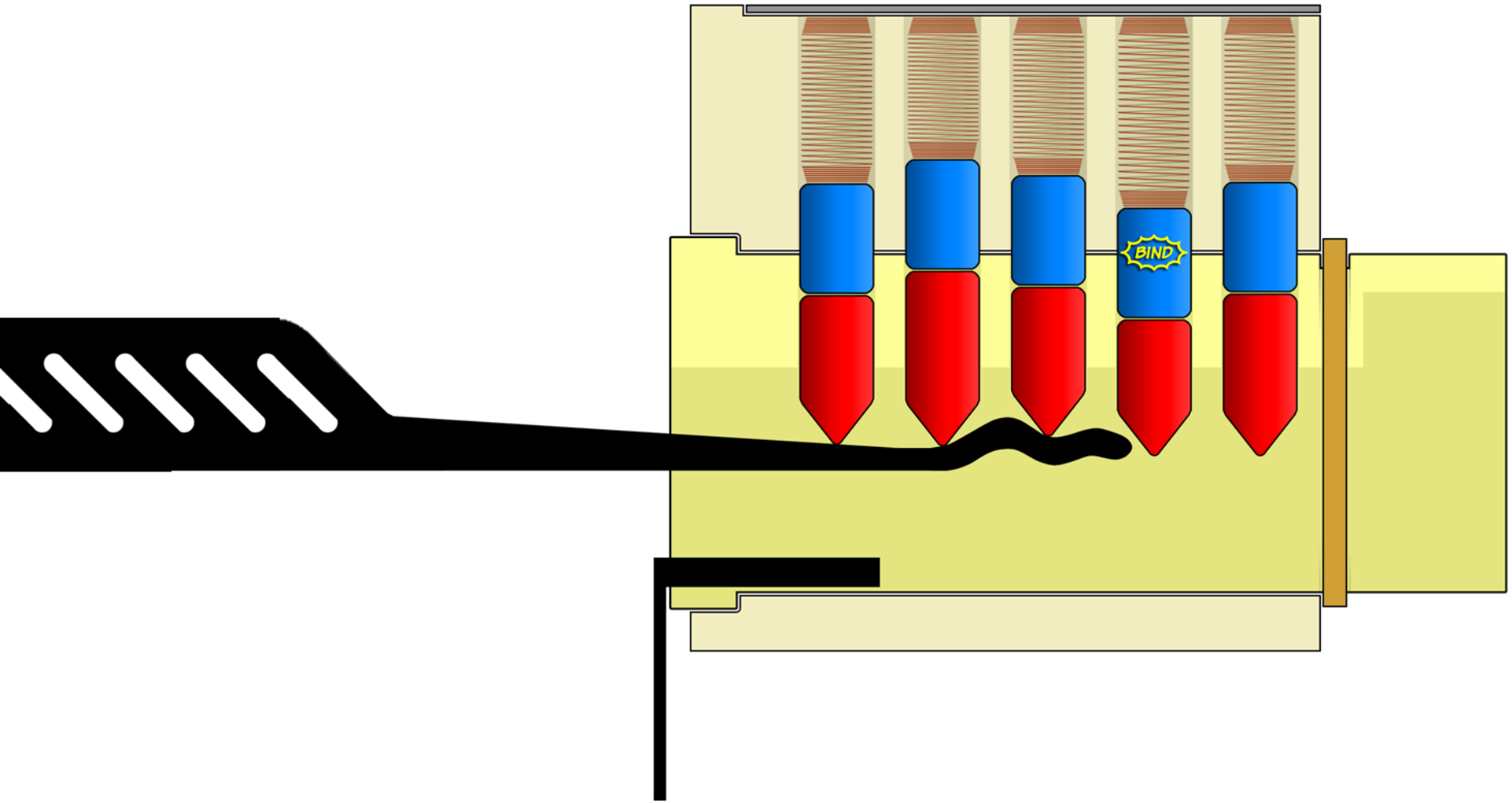
Take Caution to Avoid Over-Lifting



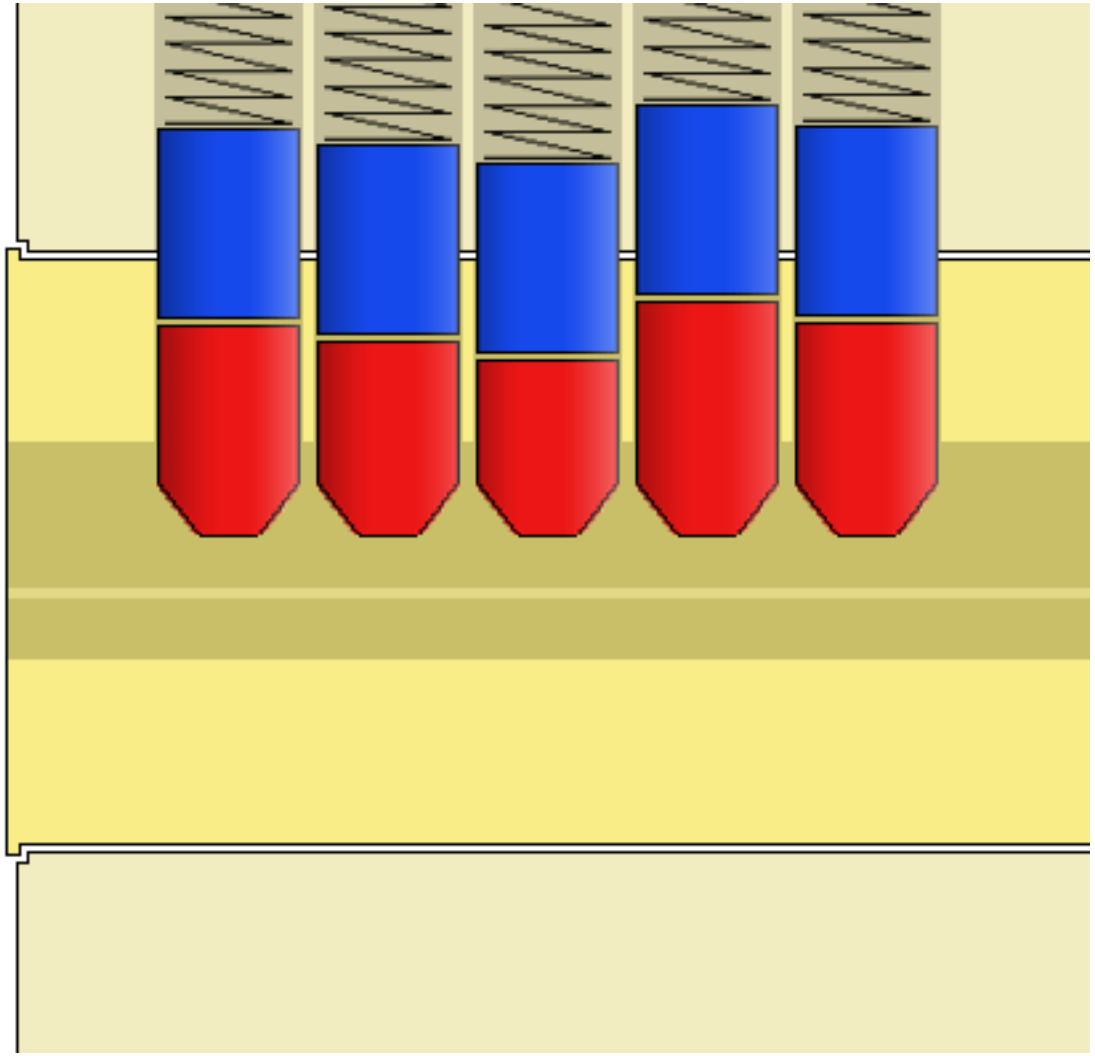
Other Tools One Uses



Raking

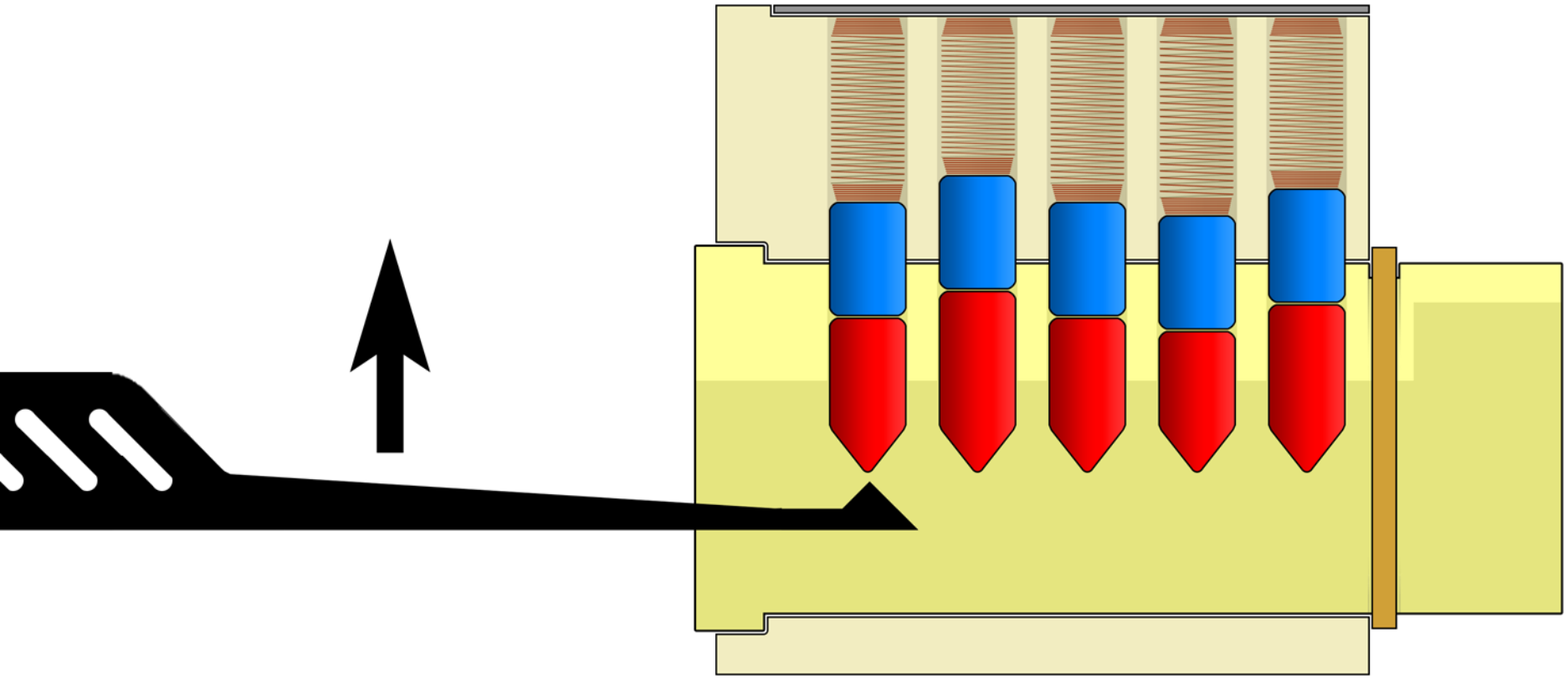


Raking

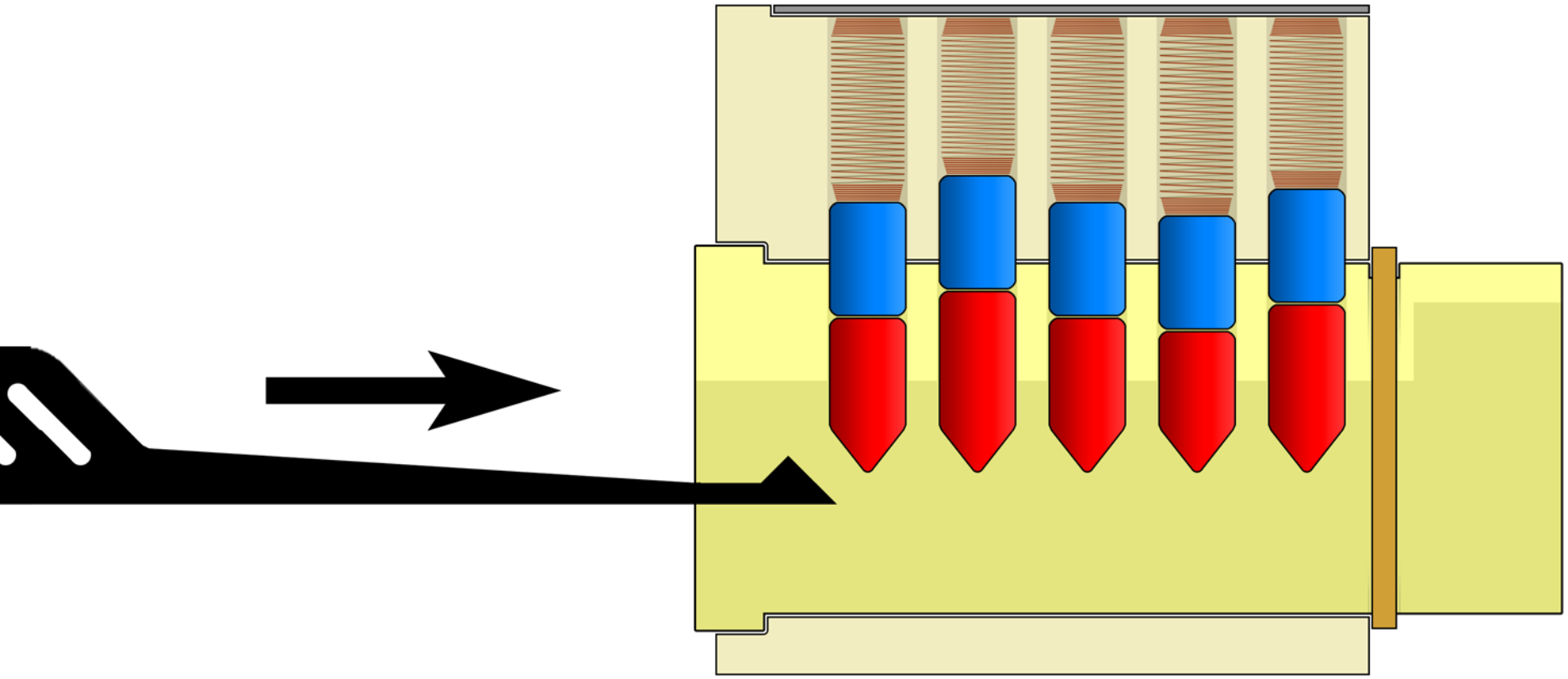


The Half-Diamond

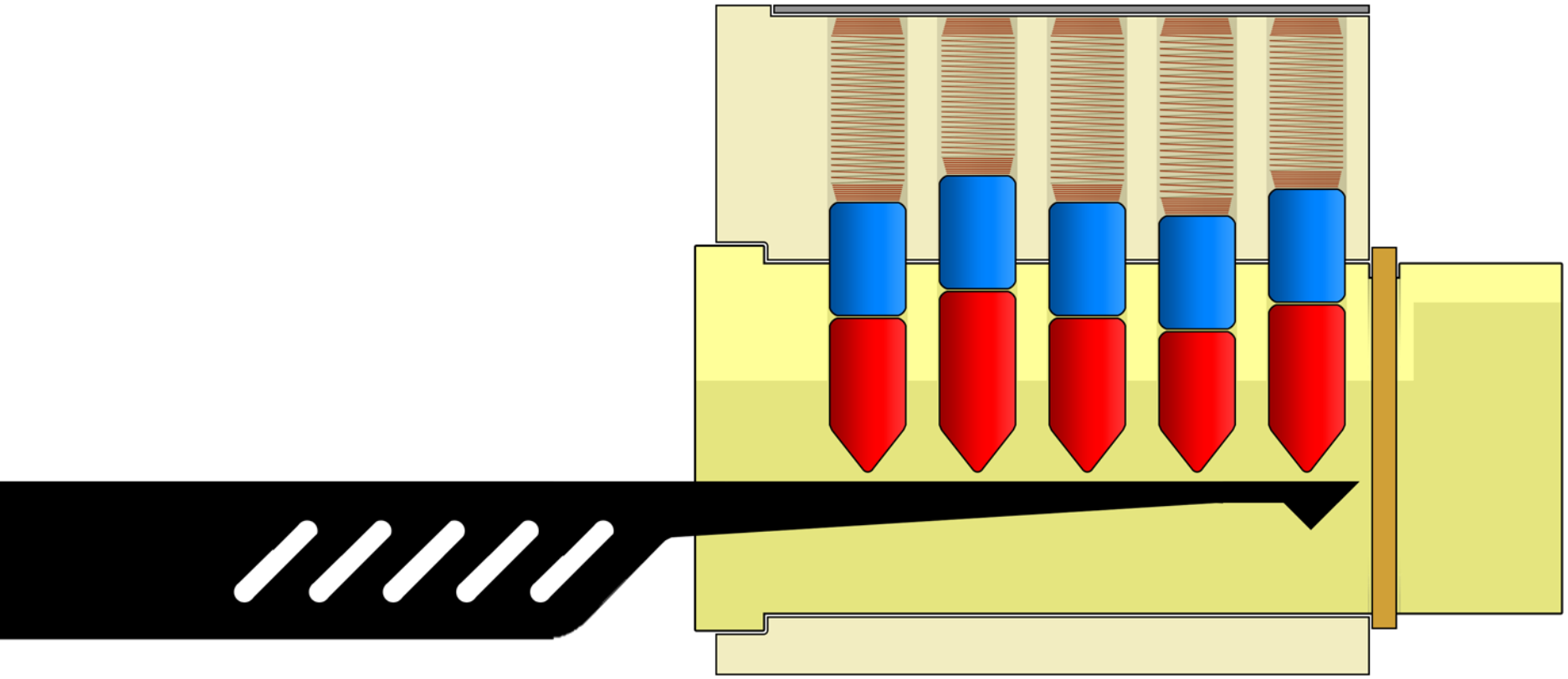
Lifting with a Half-Diamond



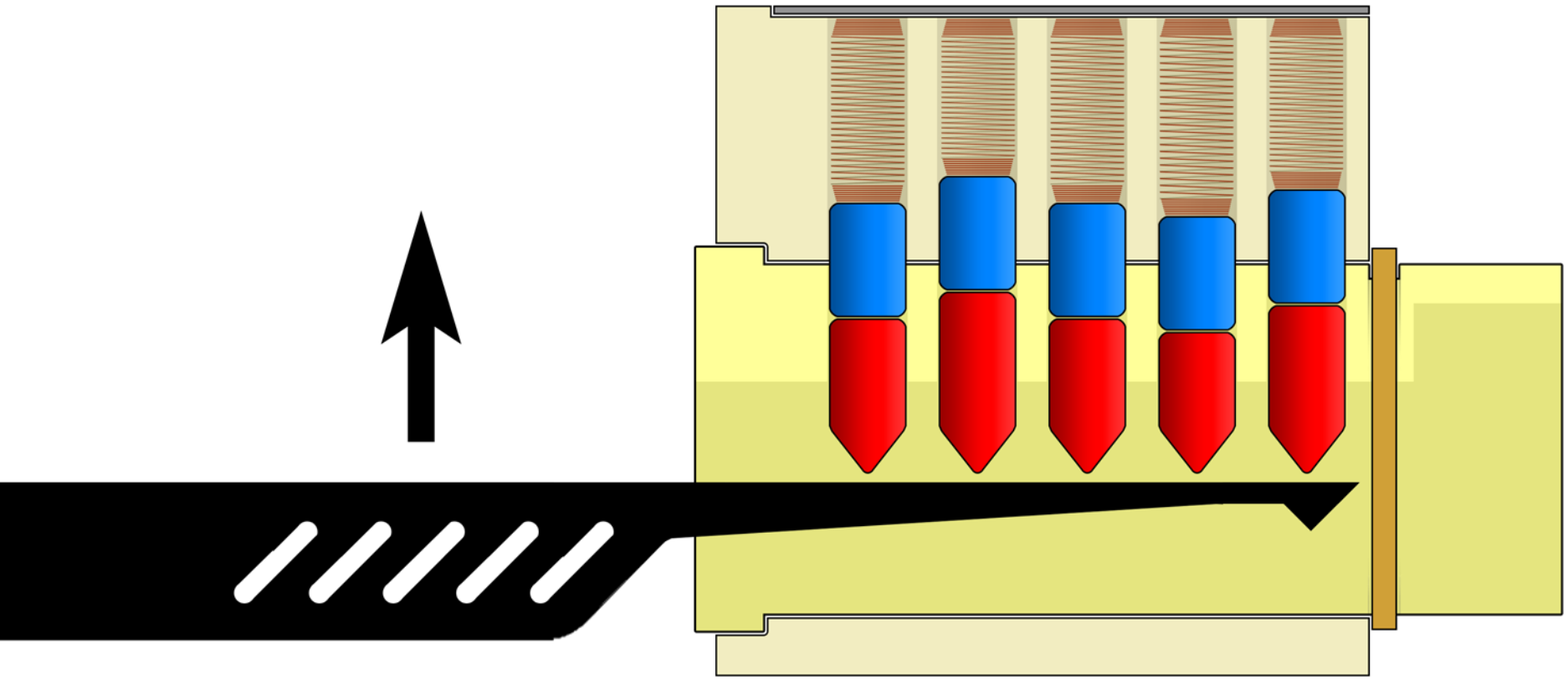
Raking/Shoveling with a Half-Diamond



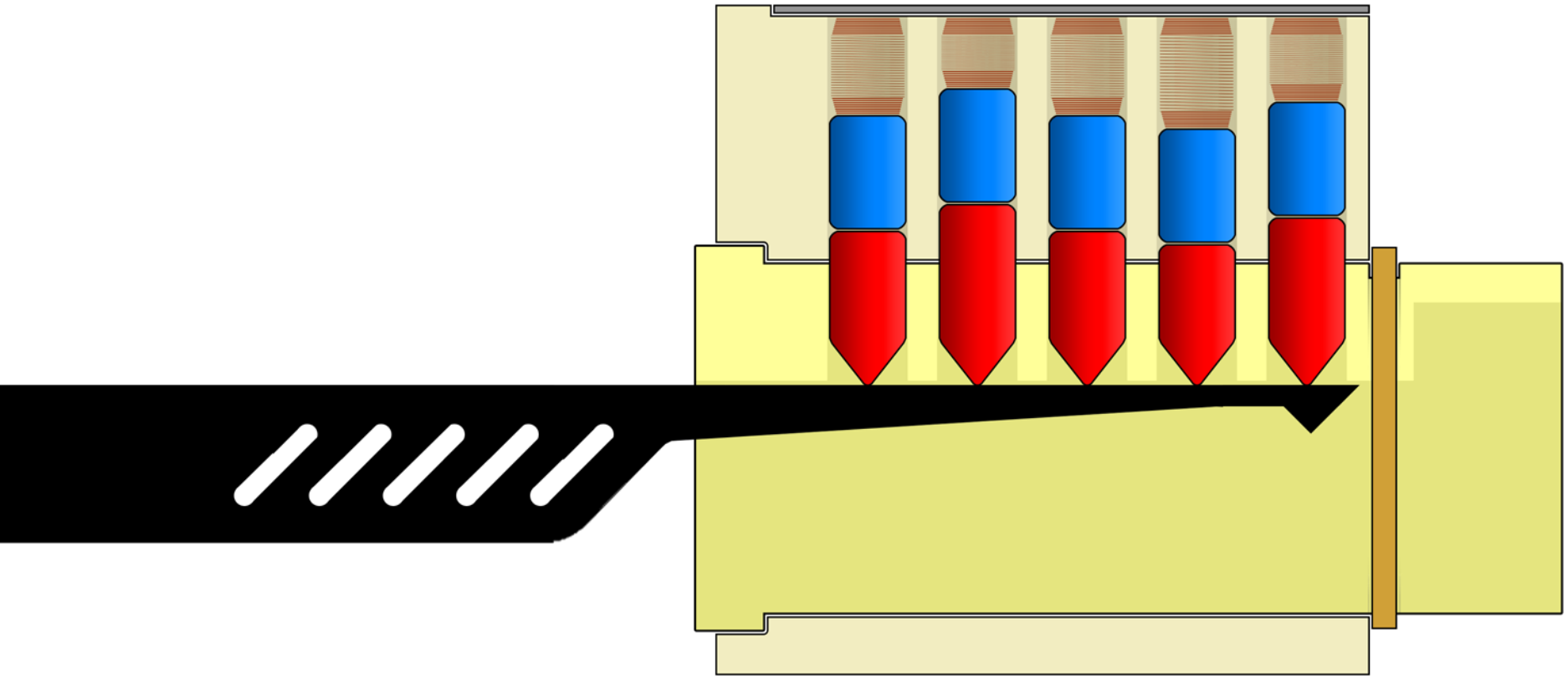
Using the Flat Underside



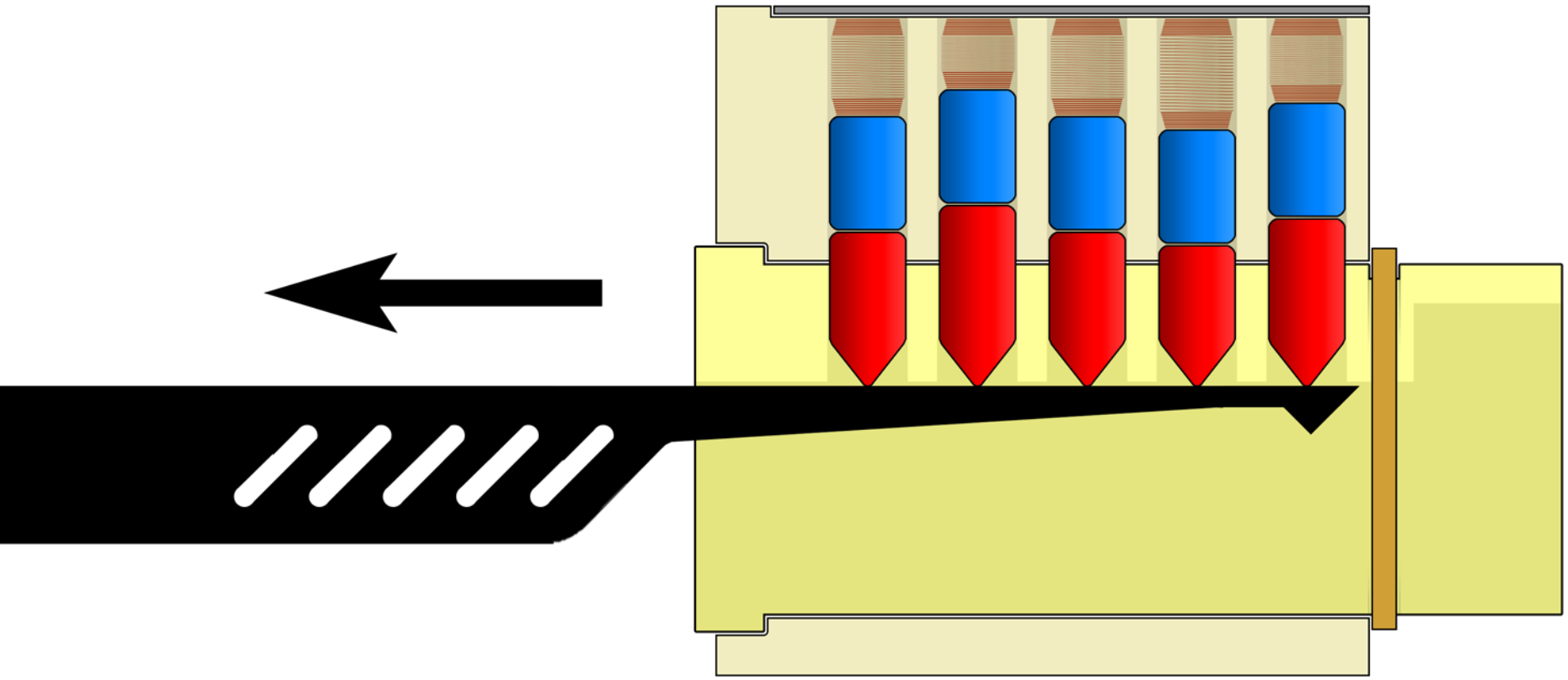
Using the Flat Underside



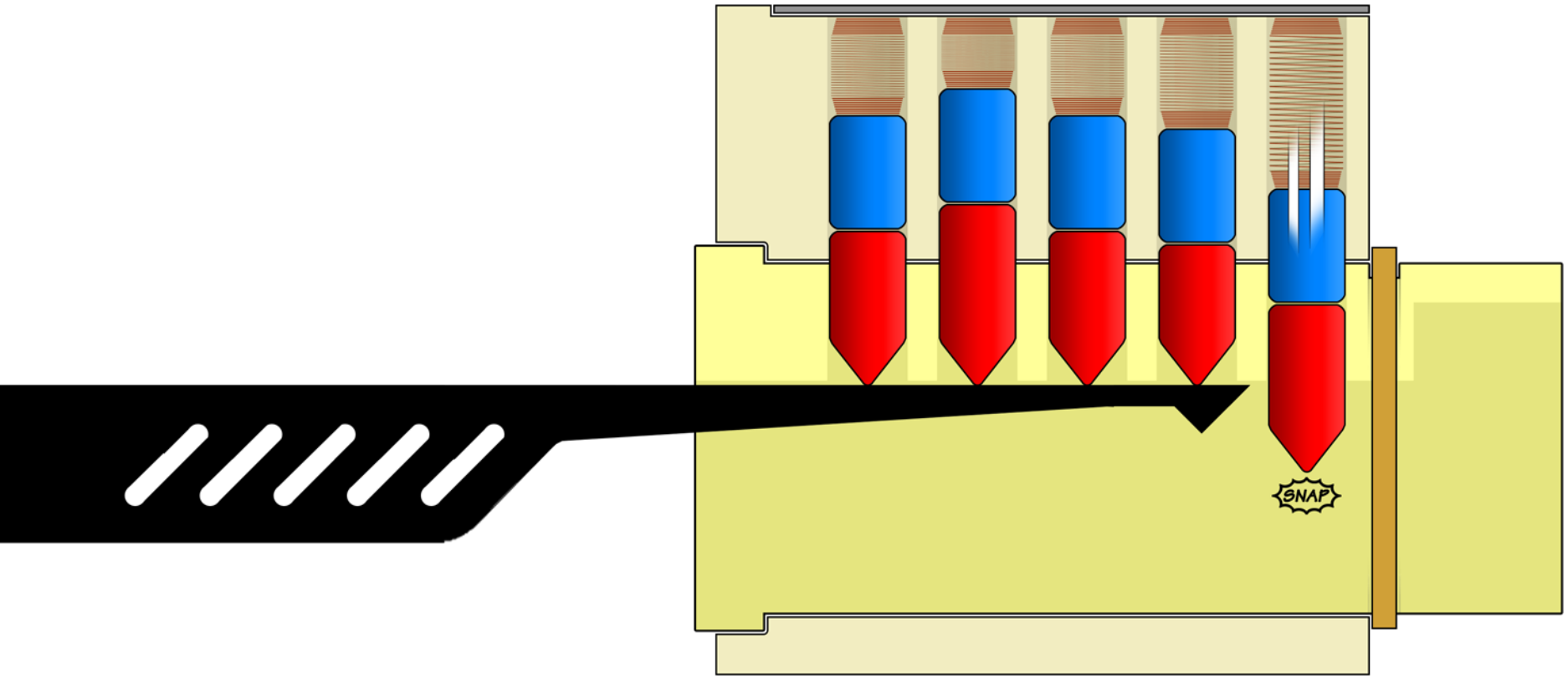
Counting Pin Stacks



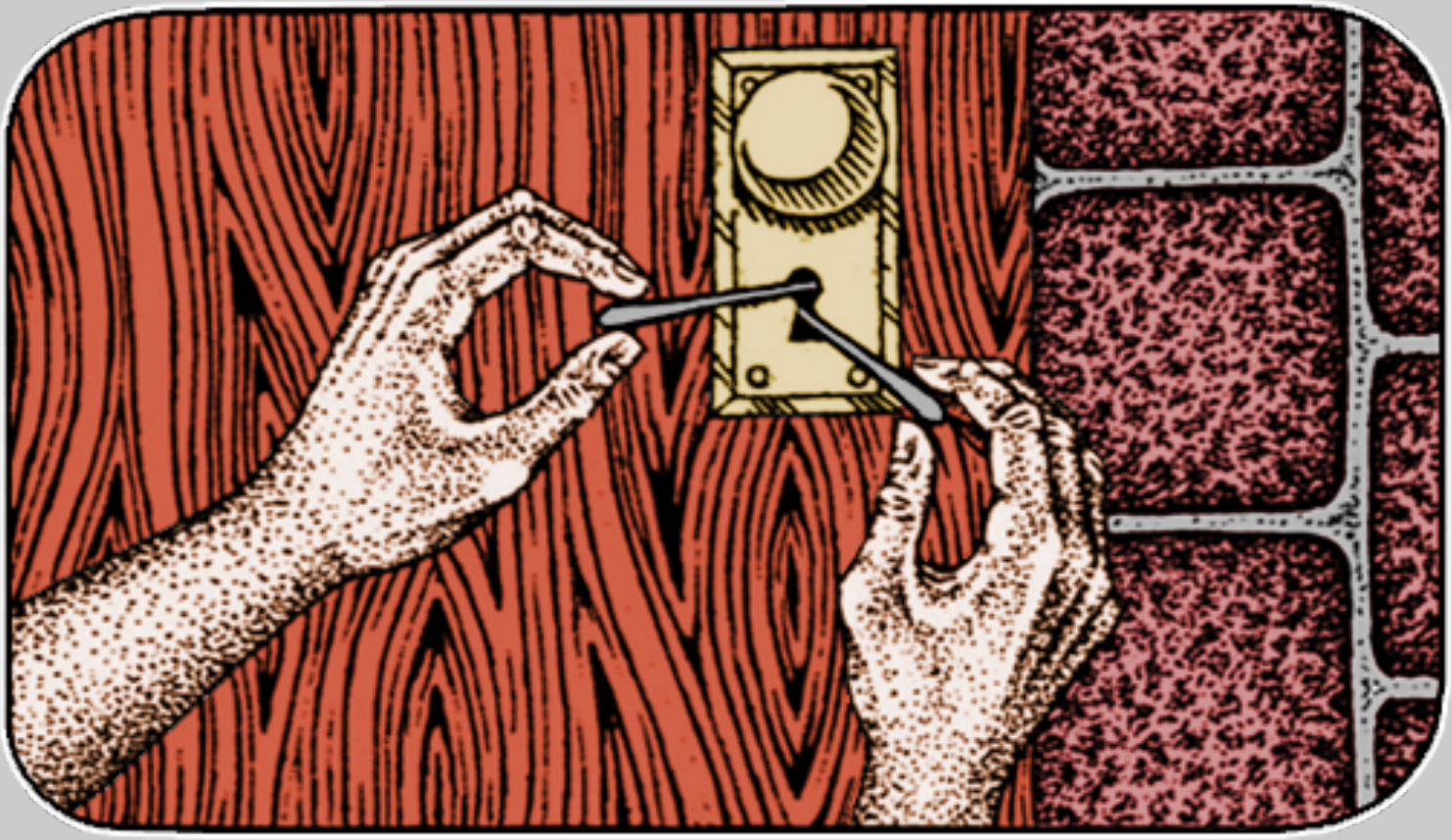
Counting Pin Stacks



Counting Pin Stacks

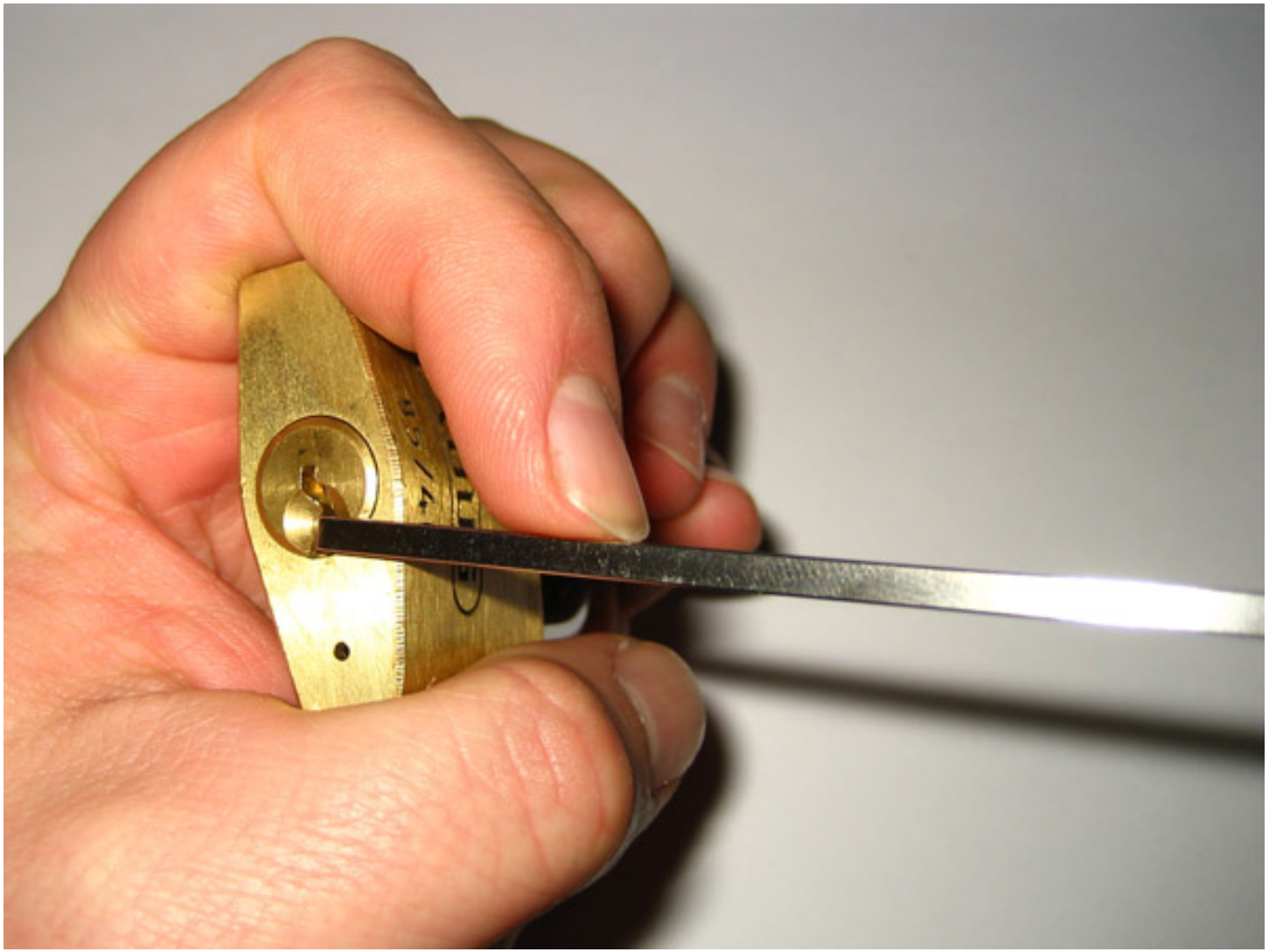


Turning Tools

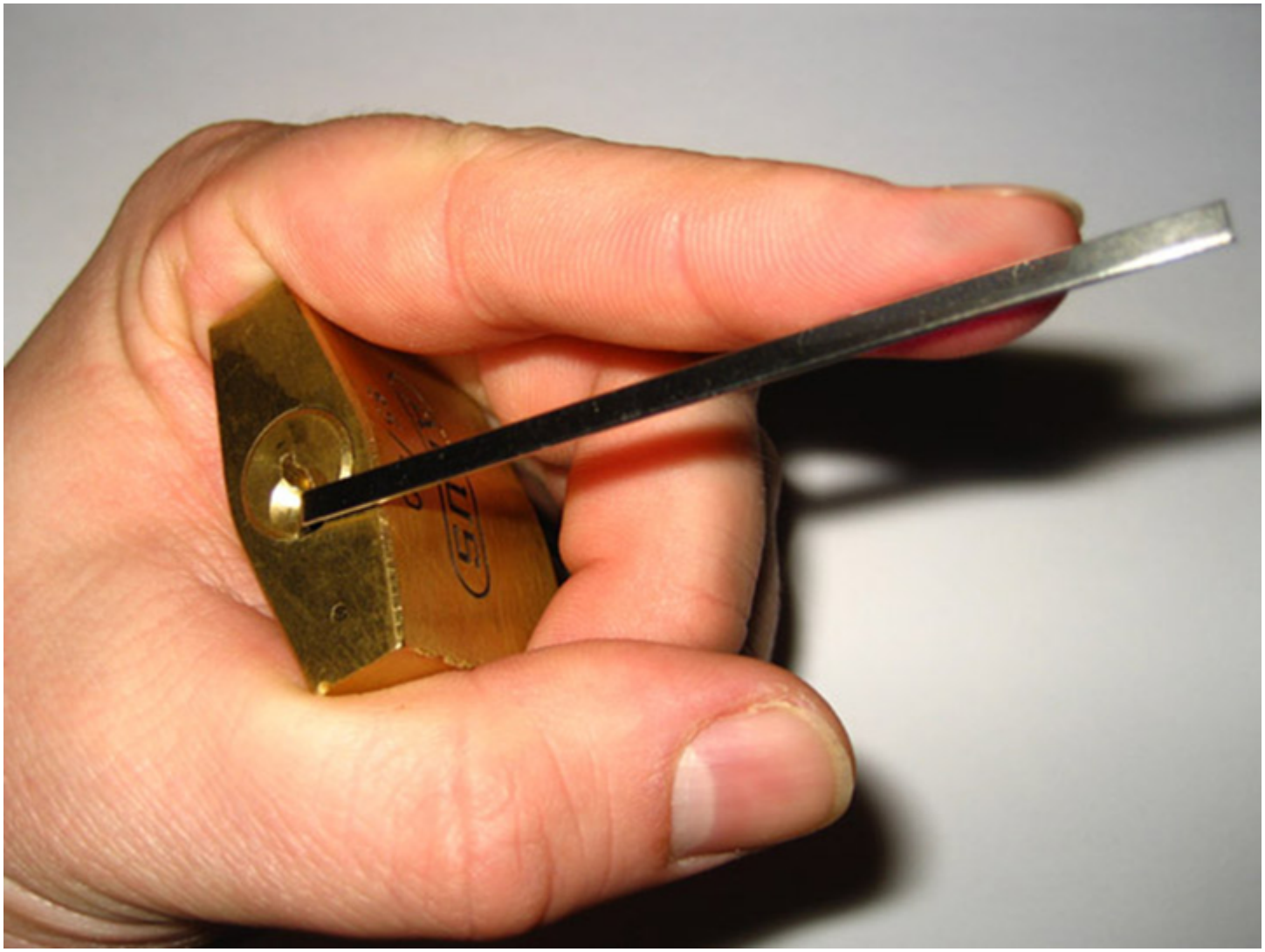


Bad Turning Tool Usage (Pulling)

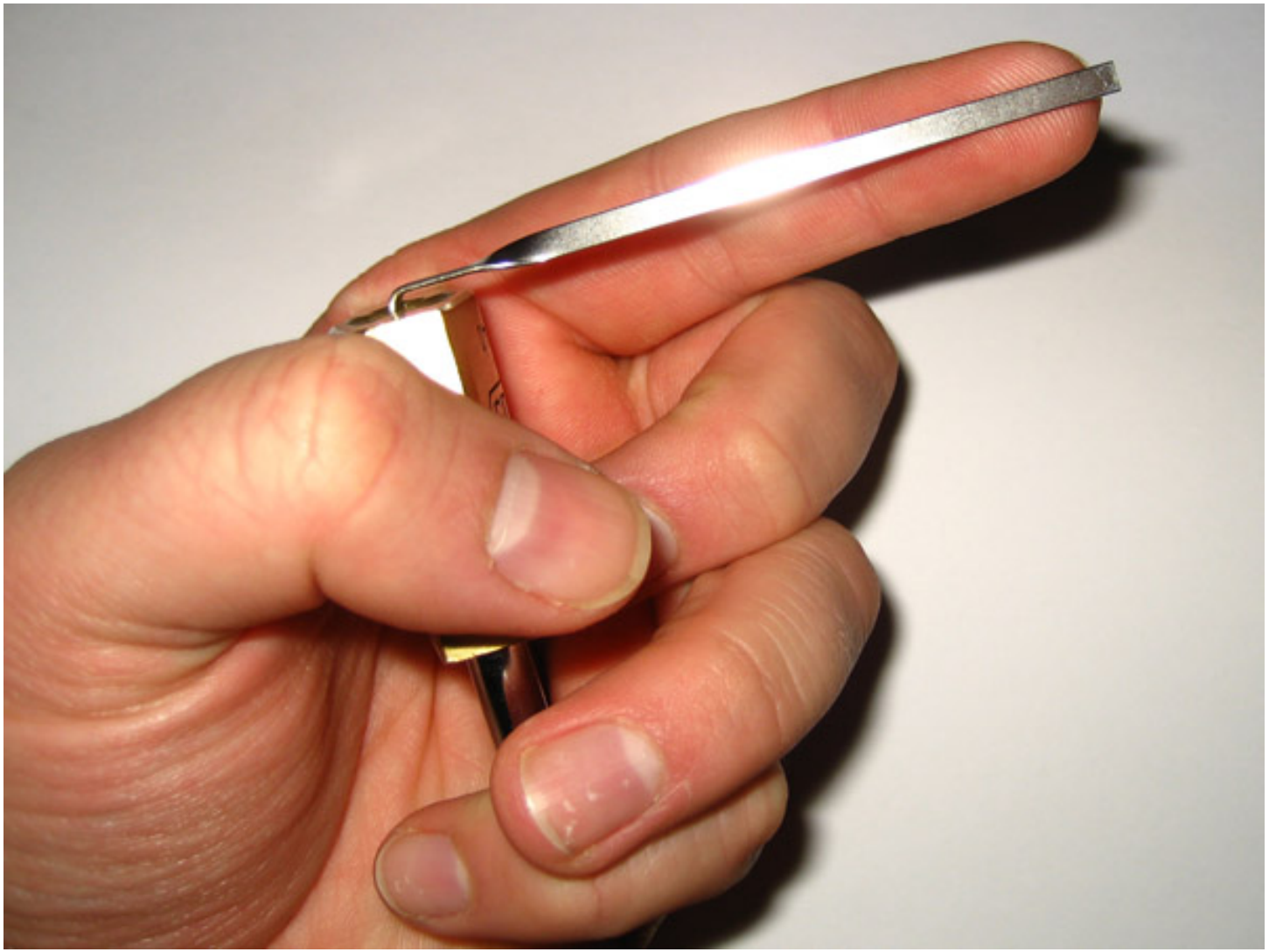
Better Turning Tool Usage (Pushing)



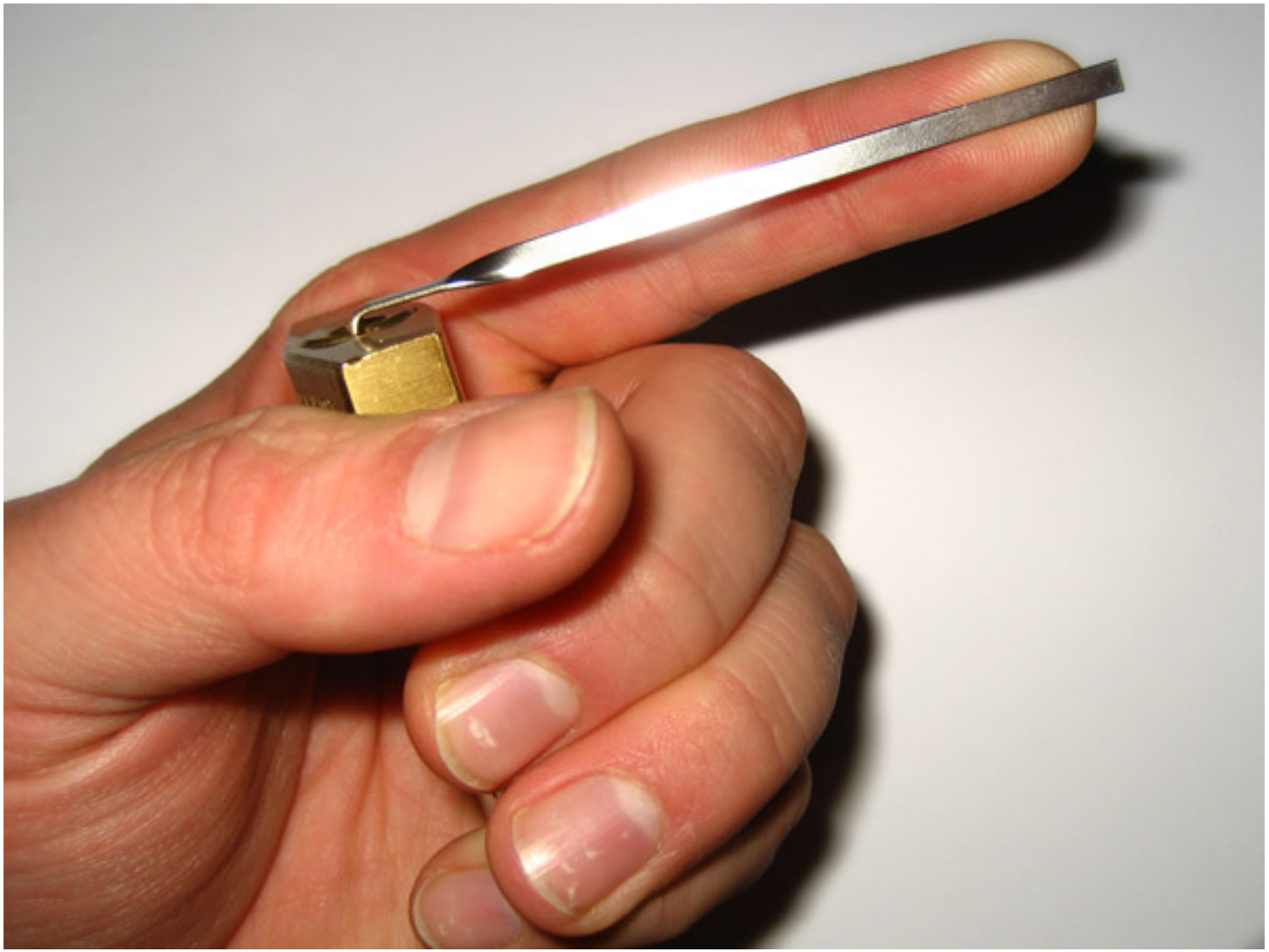
Best Turning Tool Usage (Pushing Out at Tip)



Good Turning Tool Pressure



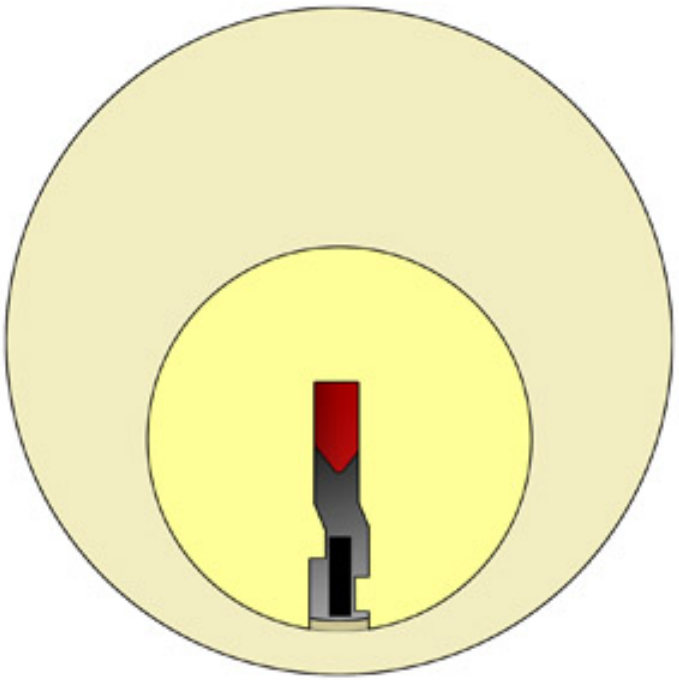
Too Much Turning Tool Pressure!

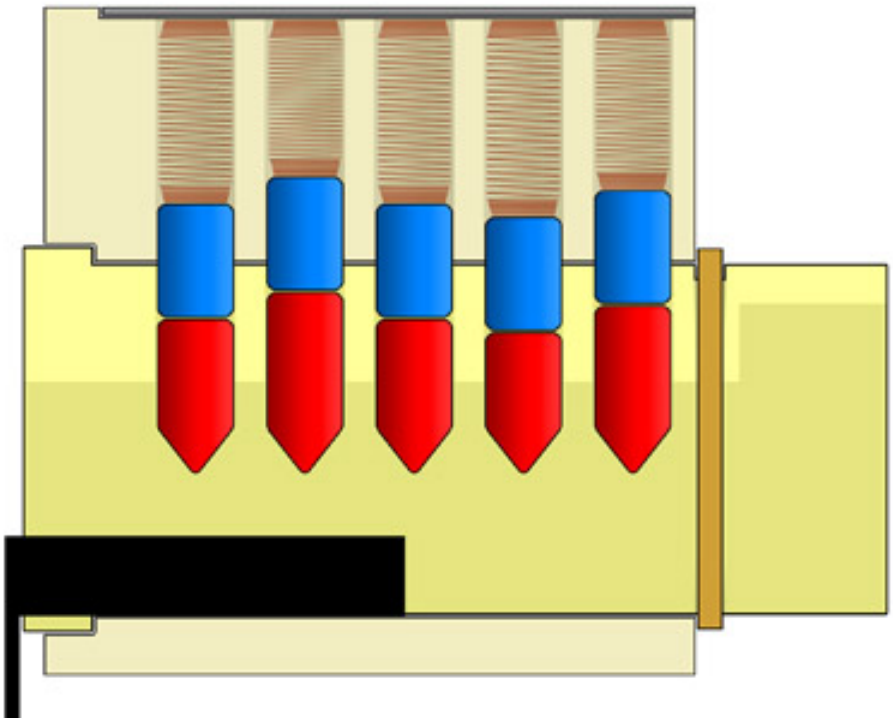


Turning Tool Position: "Edge of the Plug"

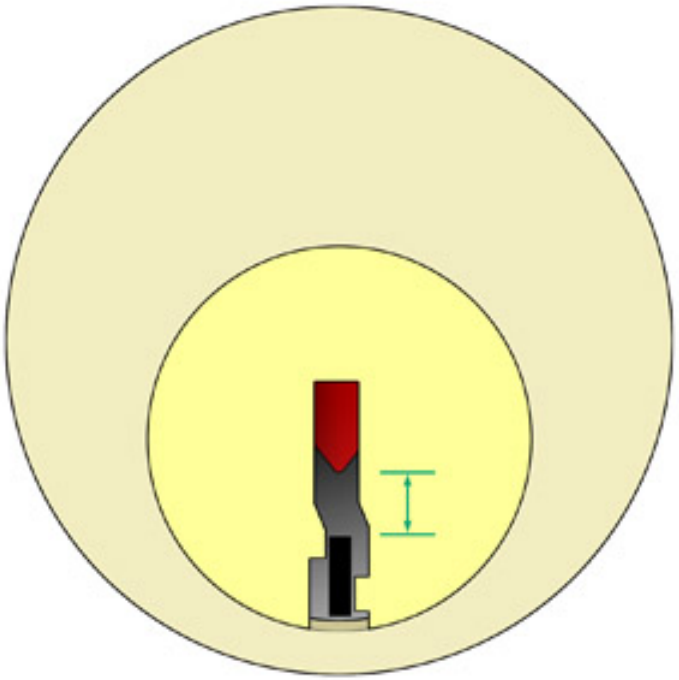
“Standard” Turning Tools

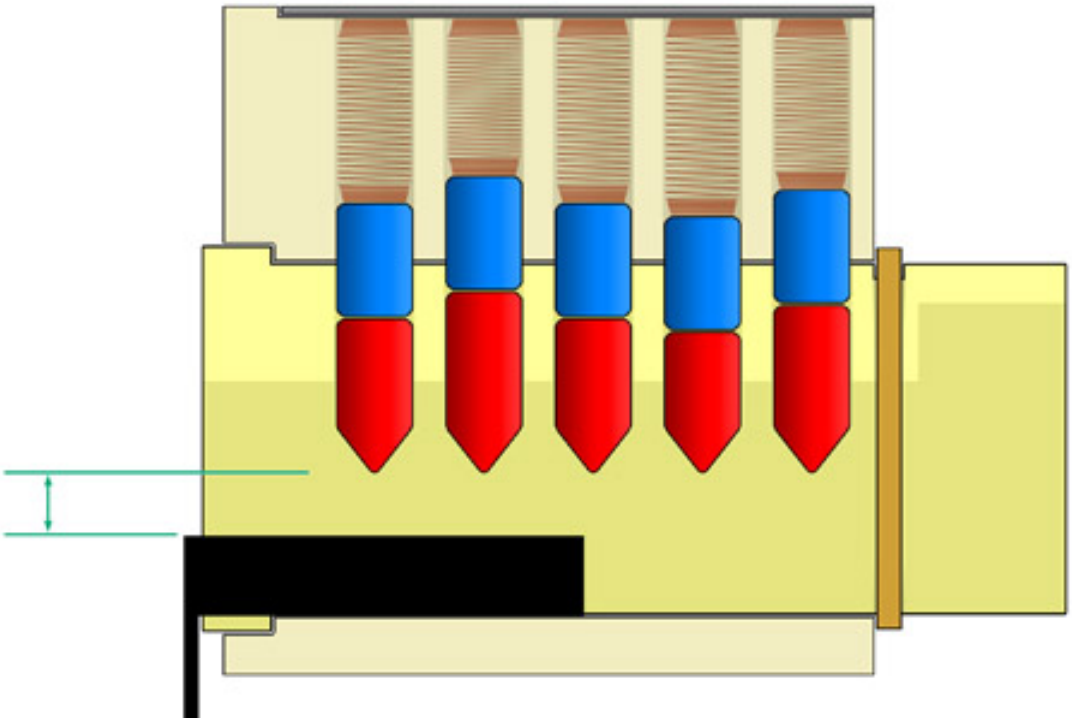
Space in the Keyway



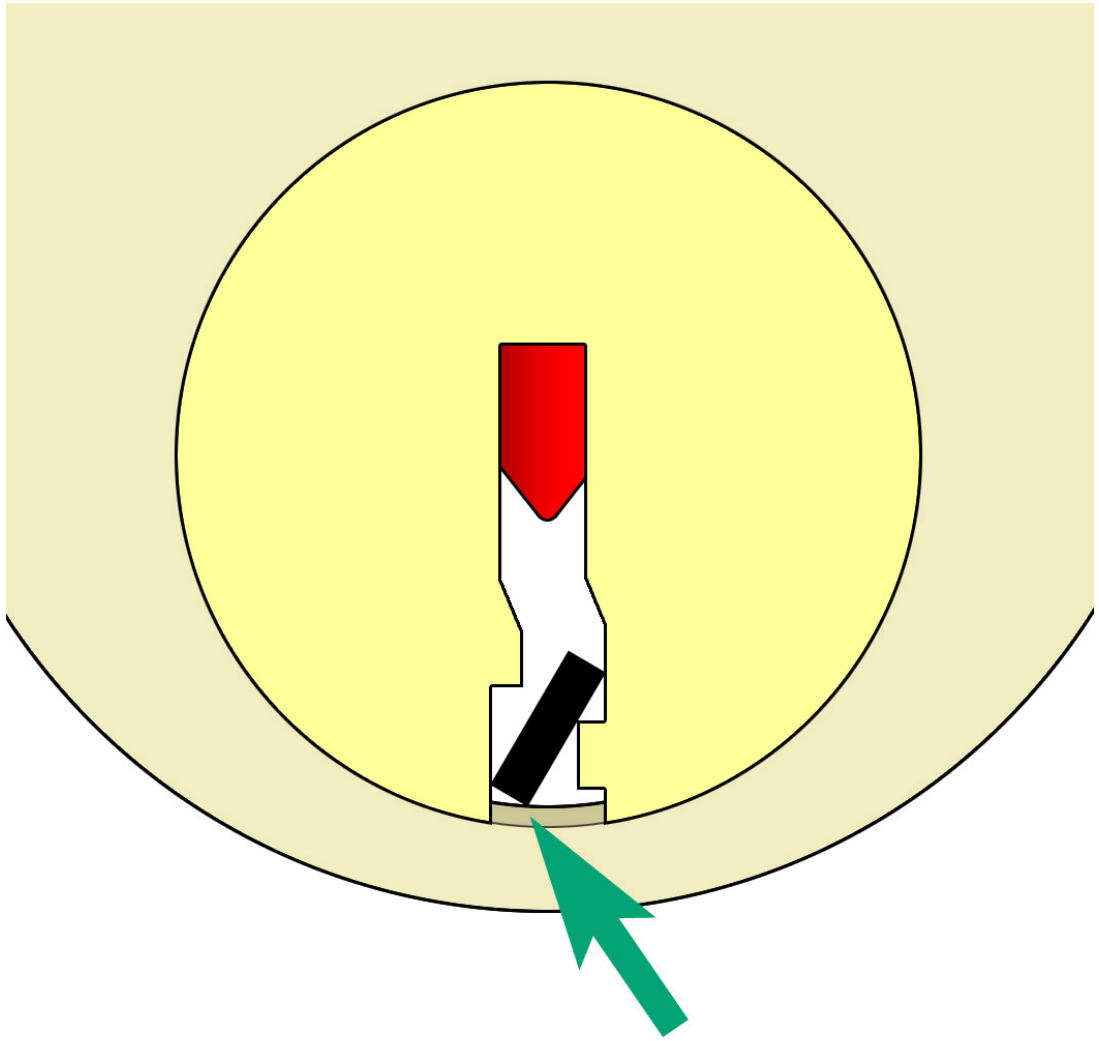


Space in the Keyway





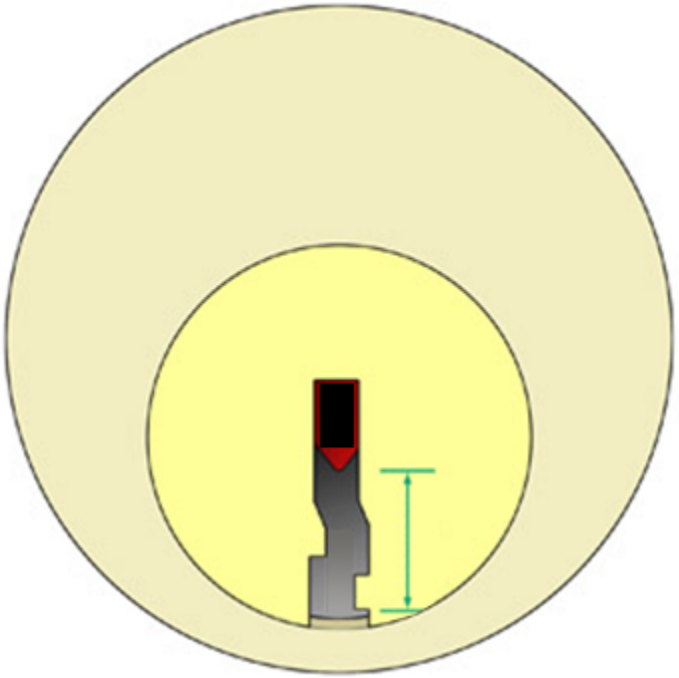
Careful to not Cause Extra Friction

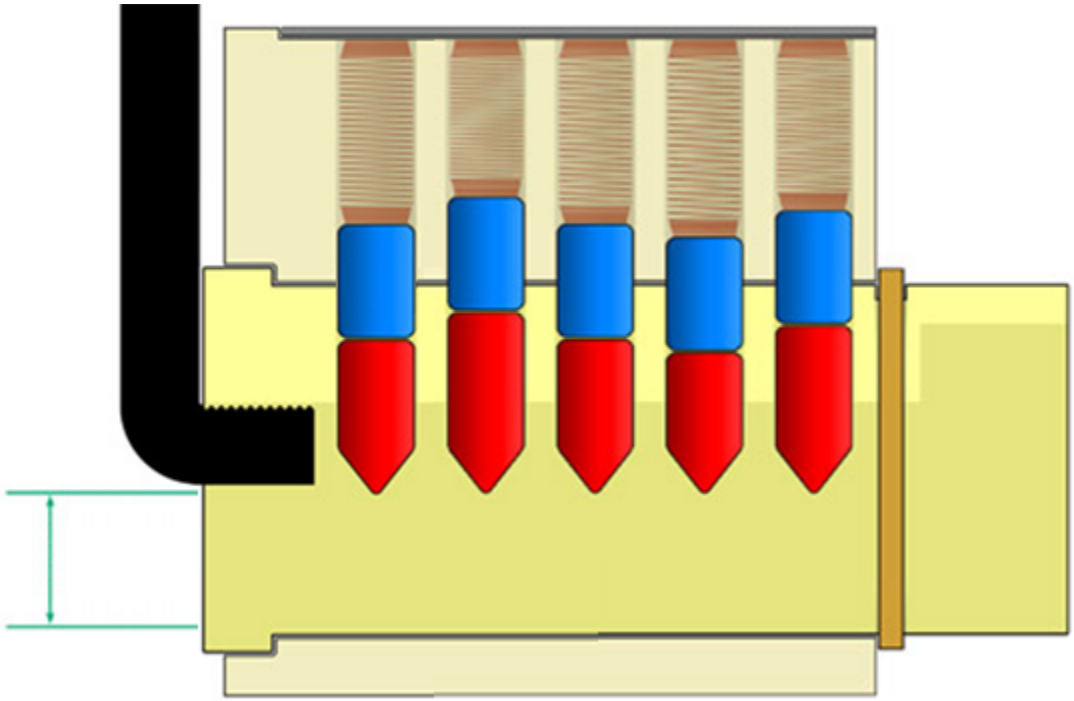


“Standard” vs “Flat” Turning Tools

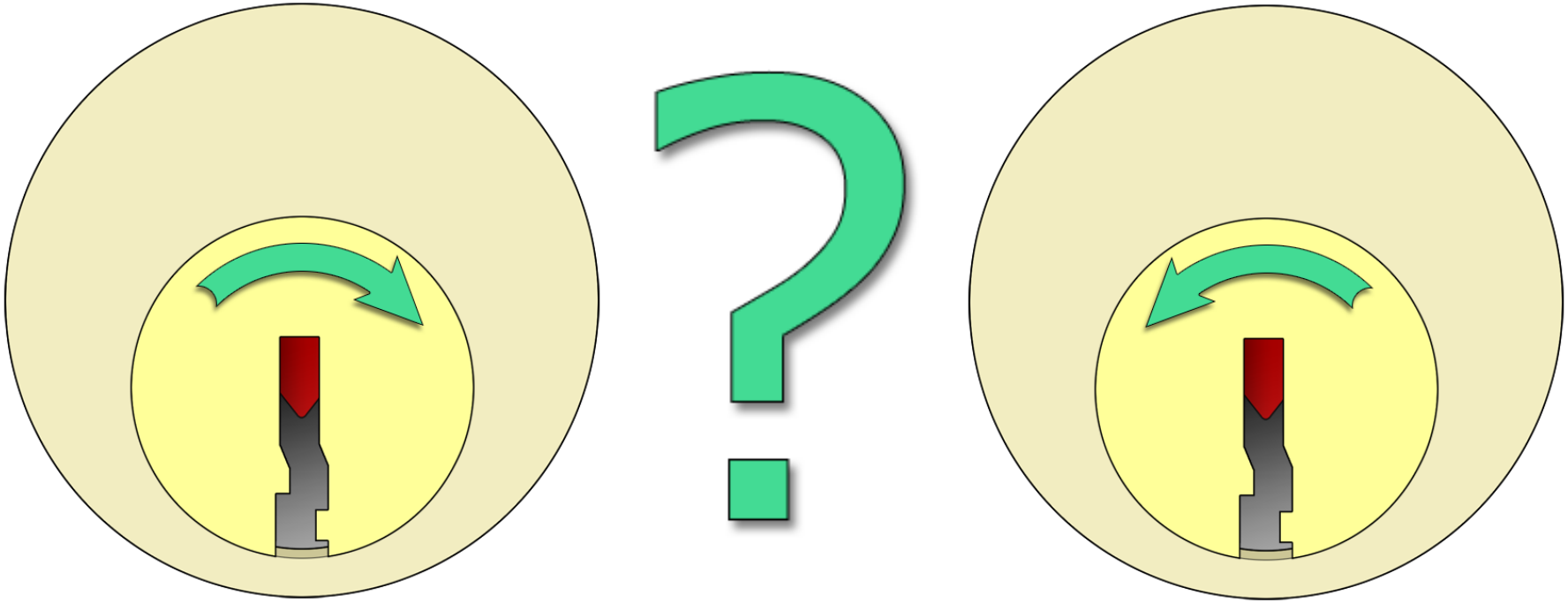
Turning Tool Position: "Center of the Plug"

More Space in the Keyway

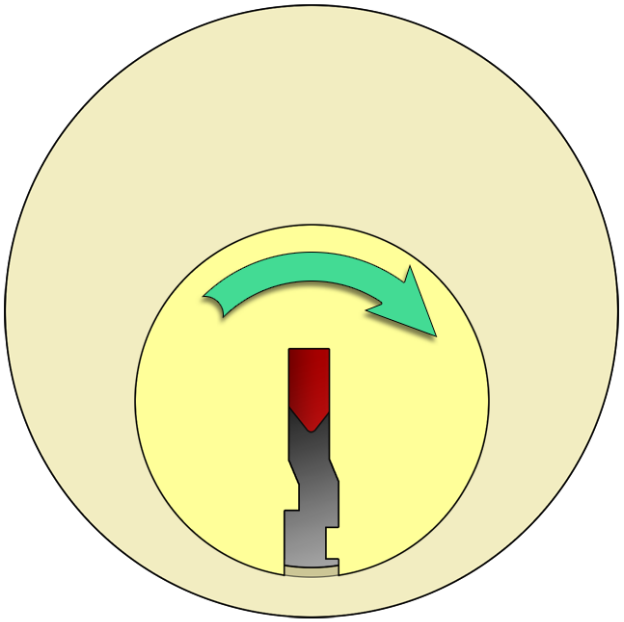




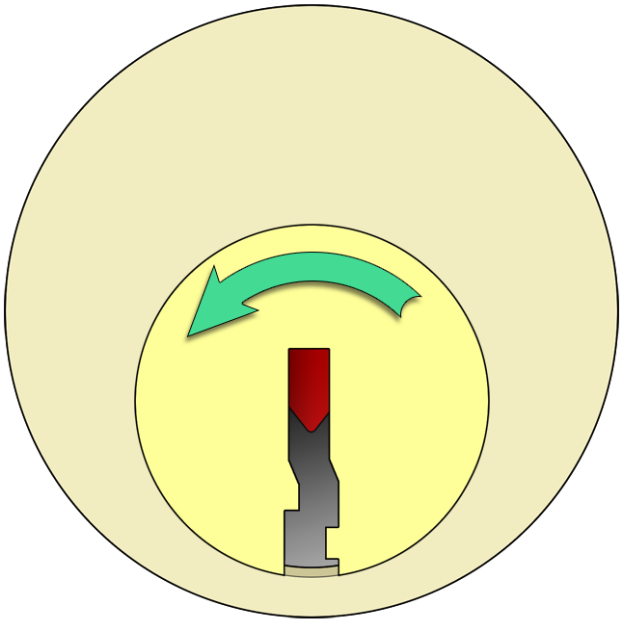
Turning Direction



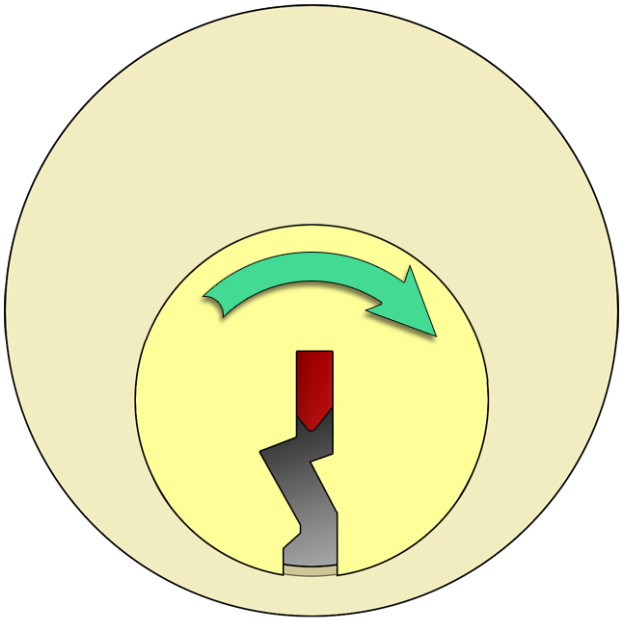
Turning Direction



Turning Direction



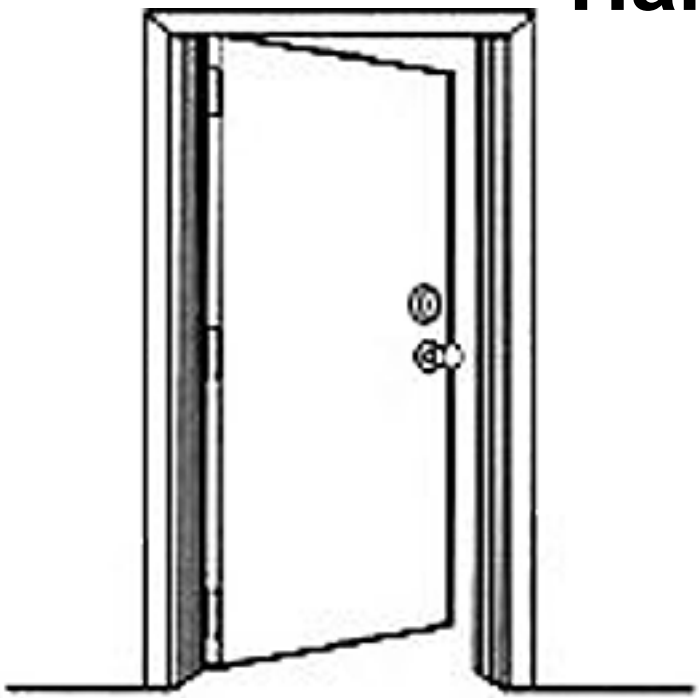
Turning Direction



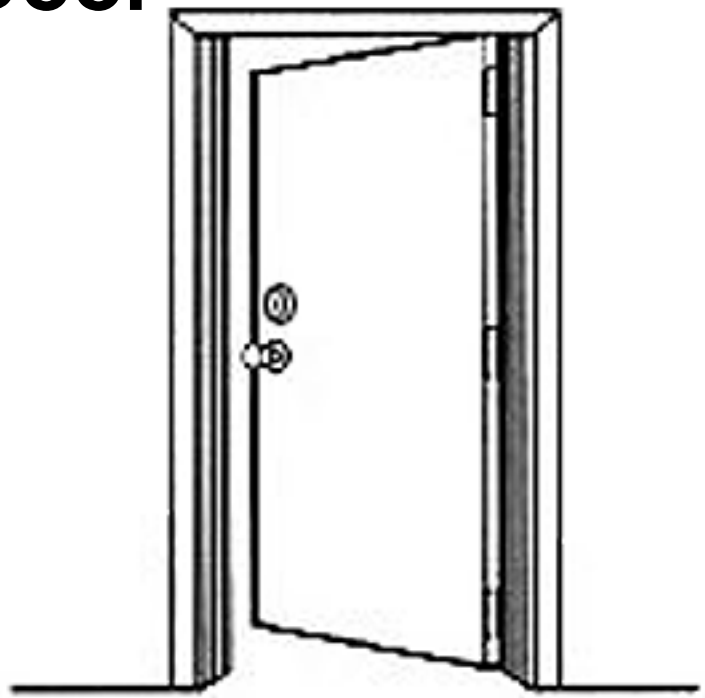
Turning Direction

Turning Direction

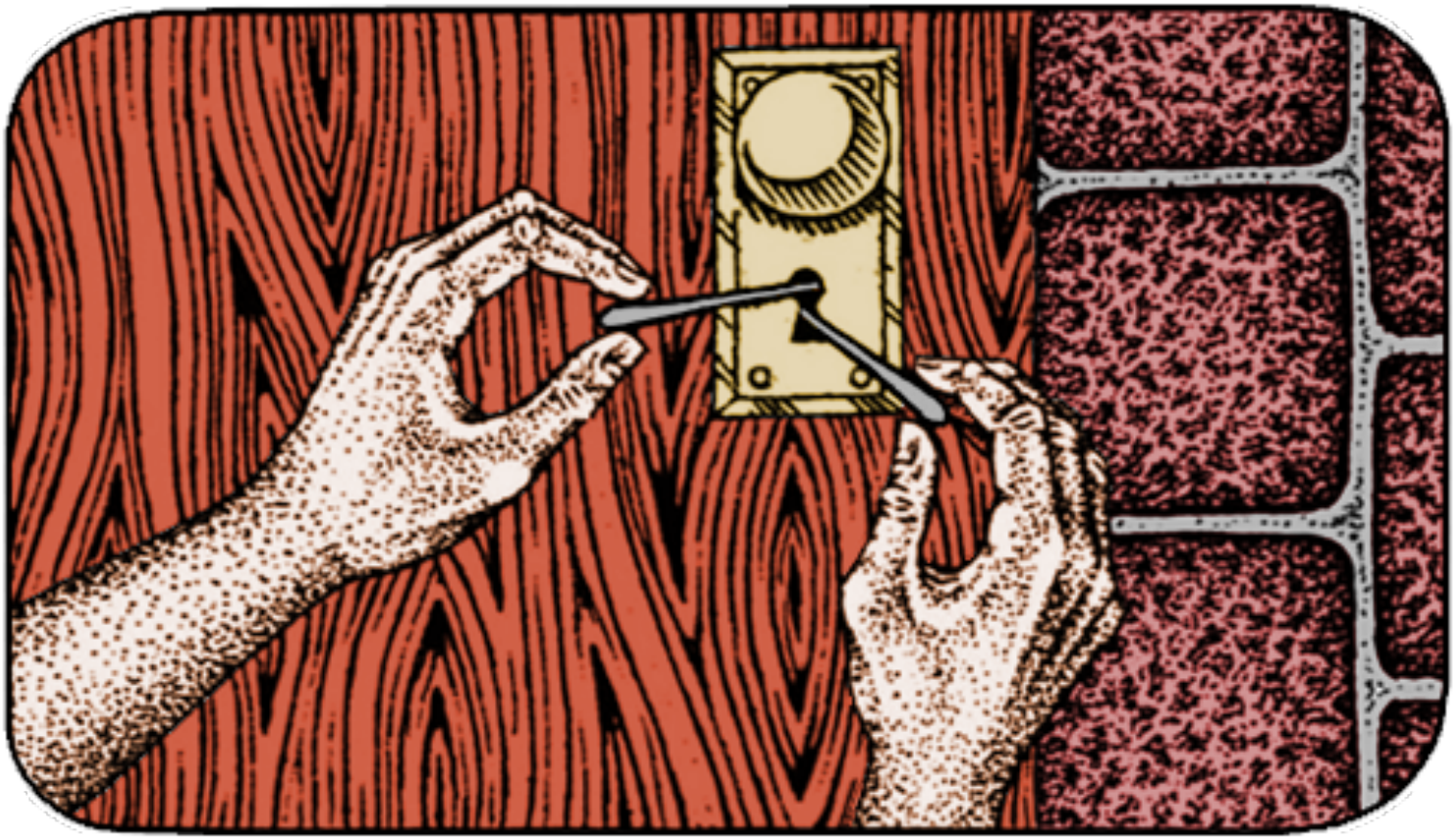
Left-Handed Door



Right-Handed Door



Who Wants To Try?



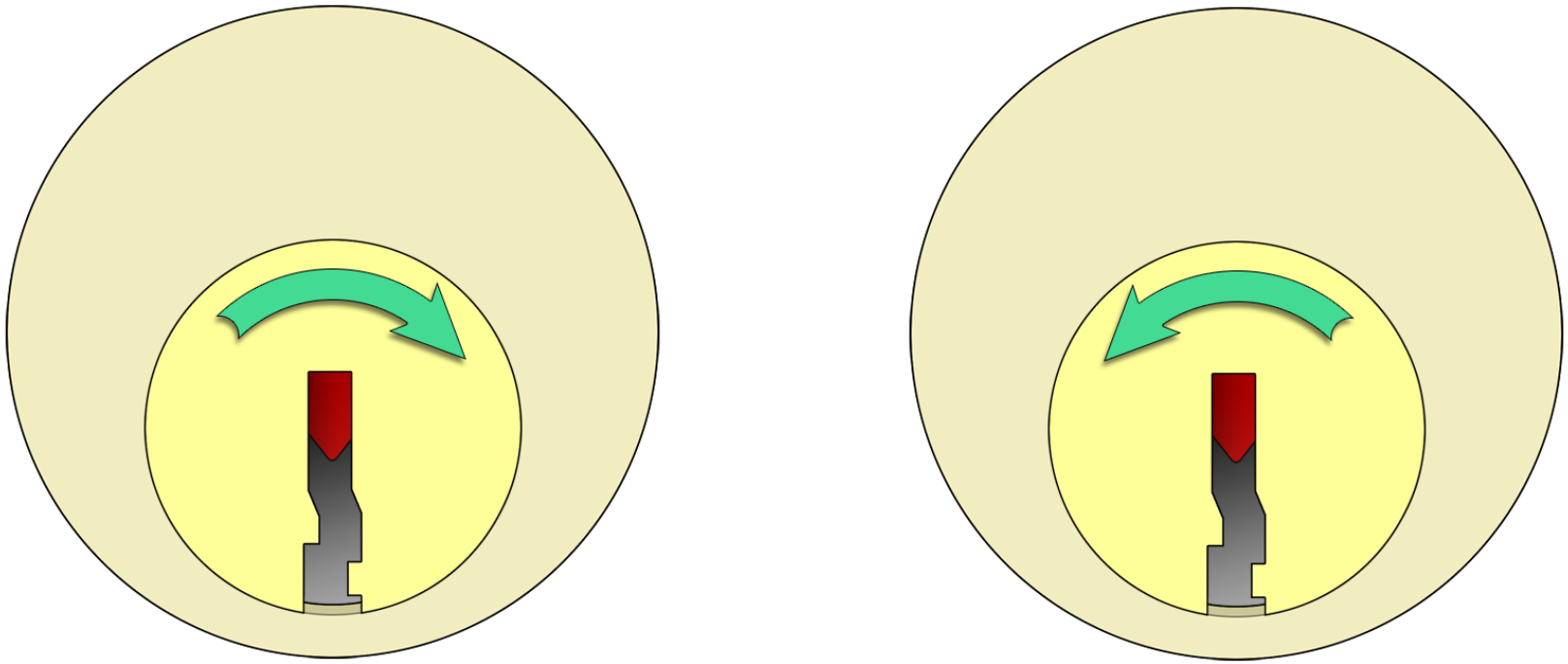
Practice Locks

Our Practice Locks

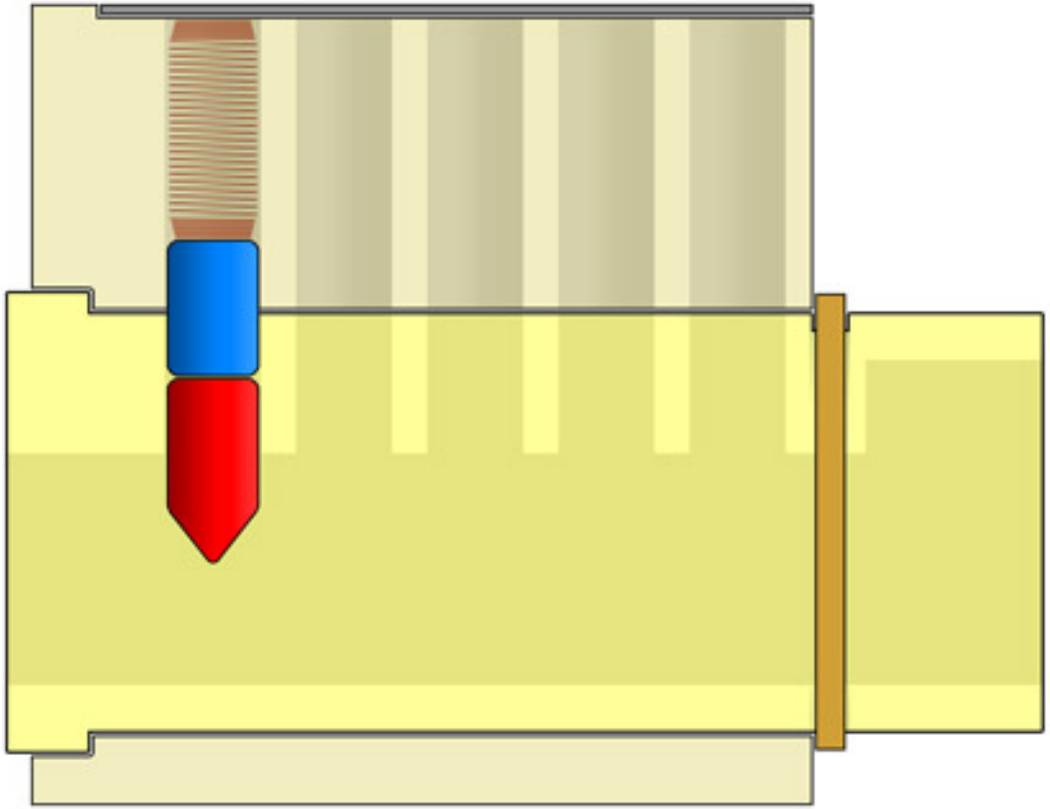
The silver part is the front face…

… the brass ring is the rear!

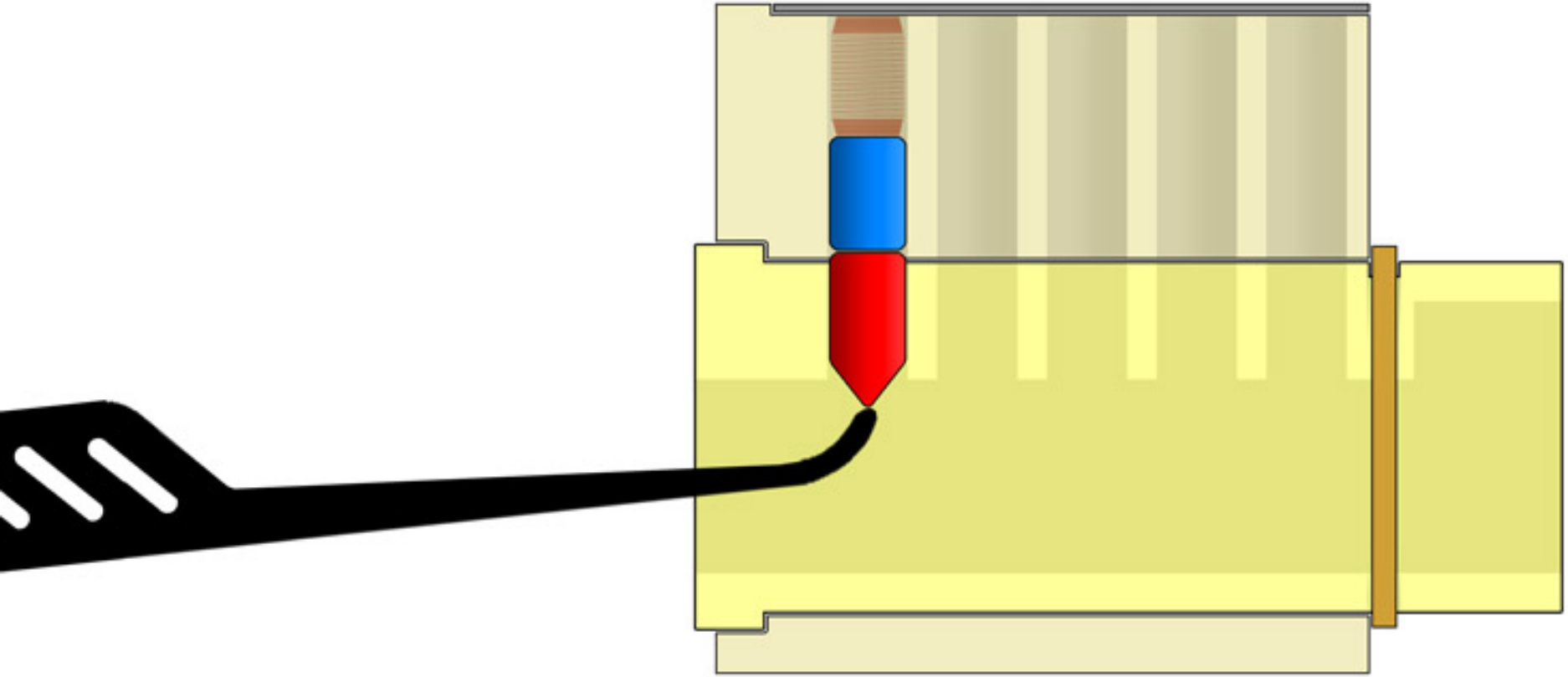
Either Direction Will Work



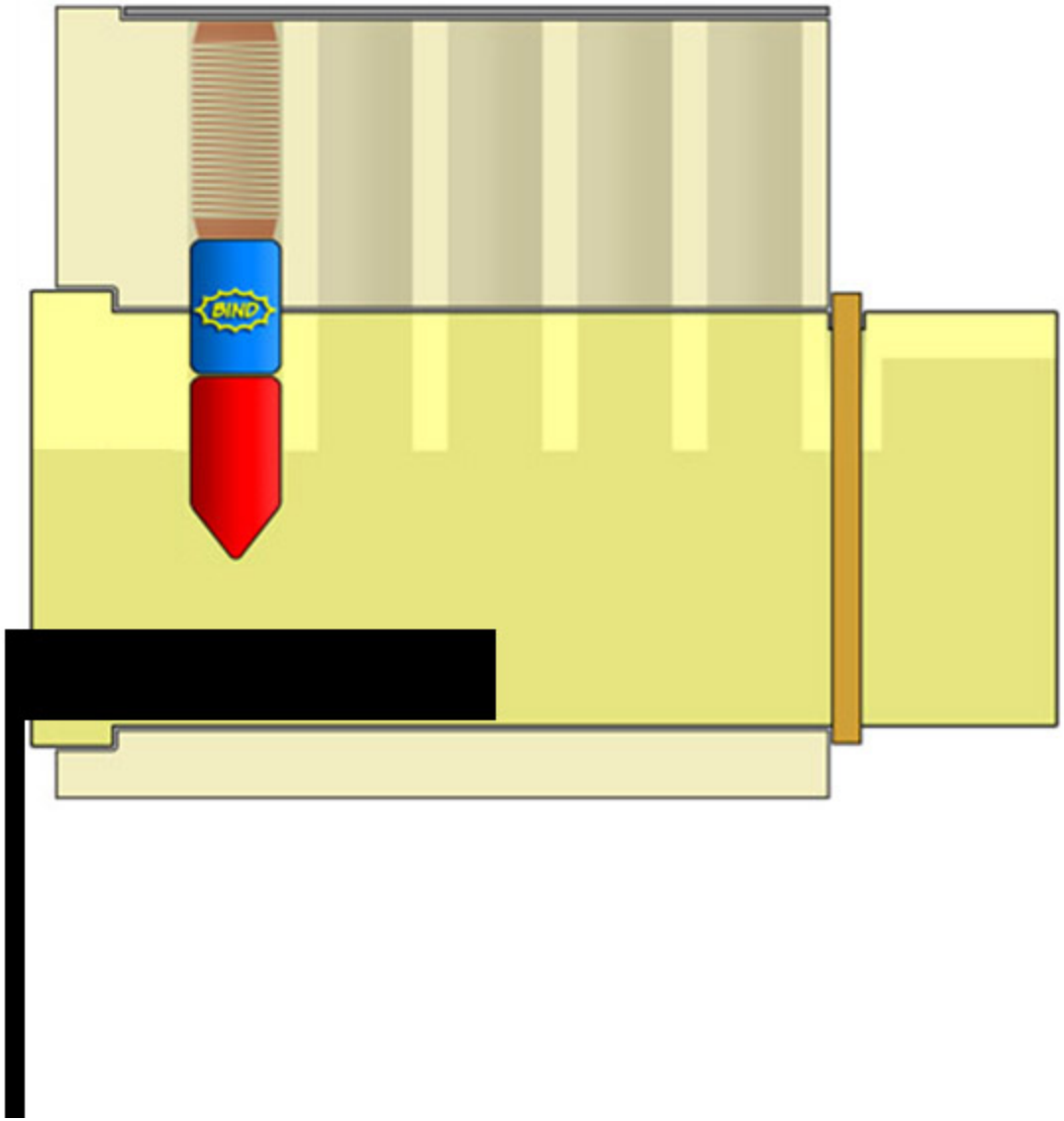
Starter Exercises



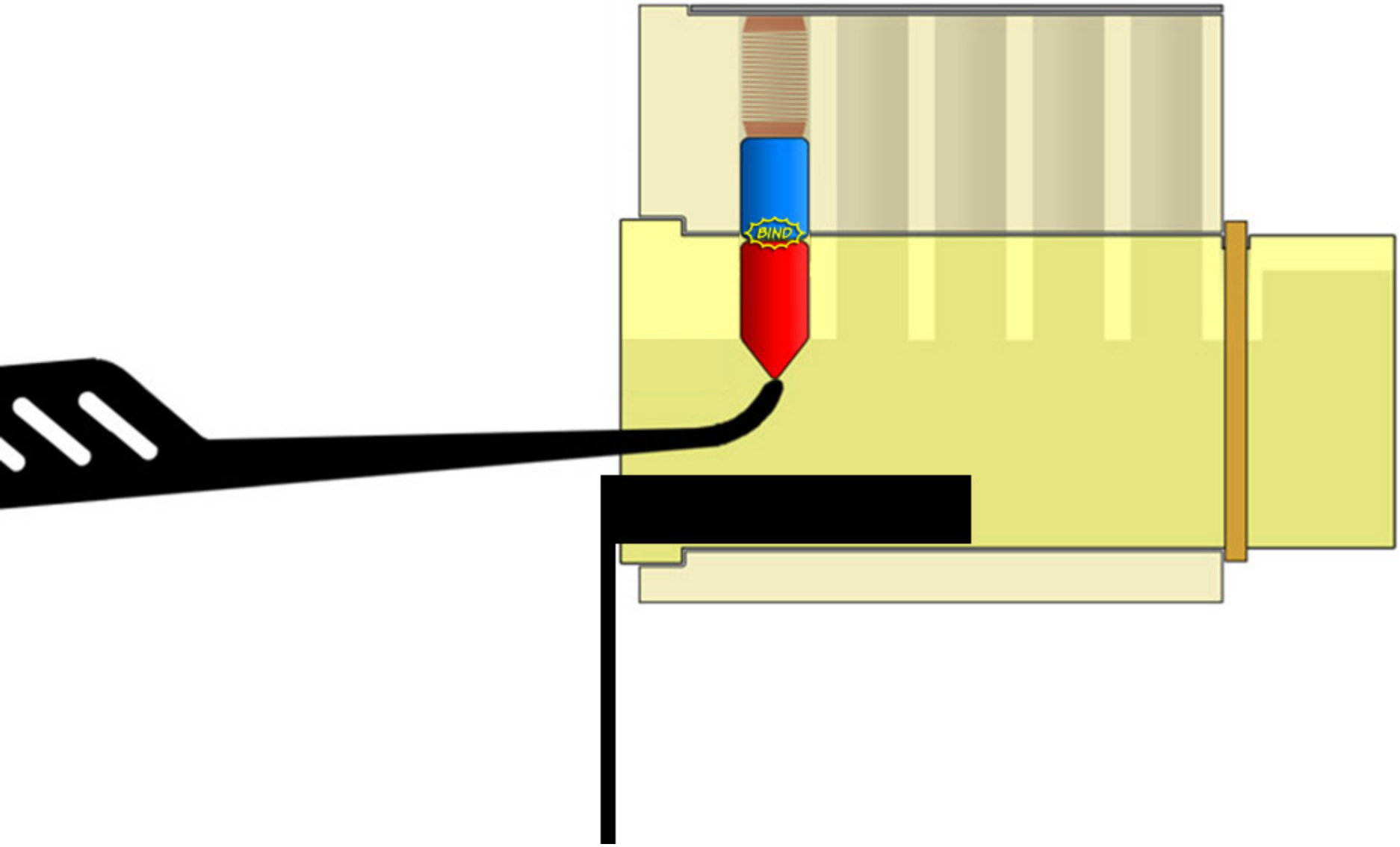
Starter Exercises



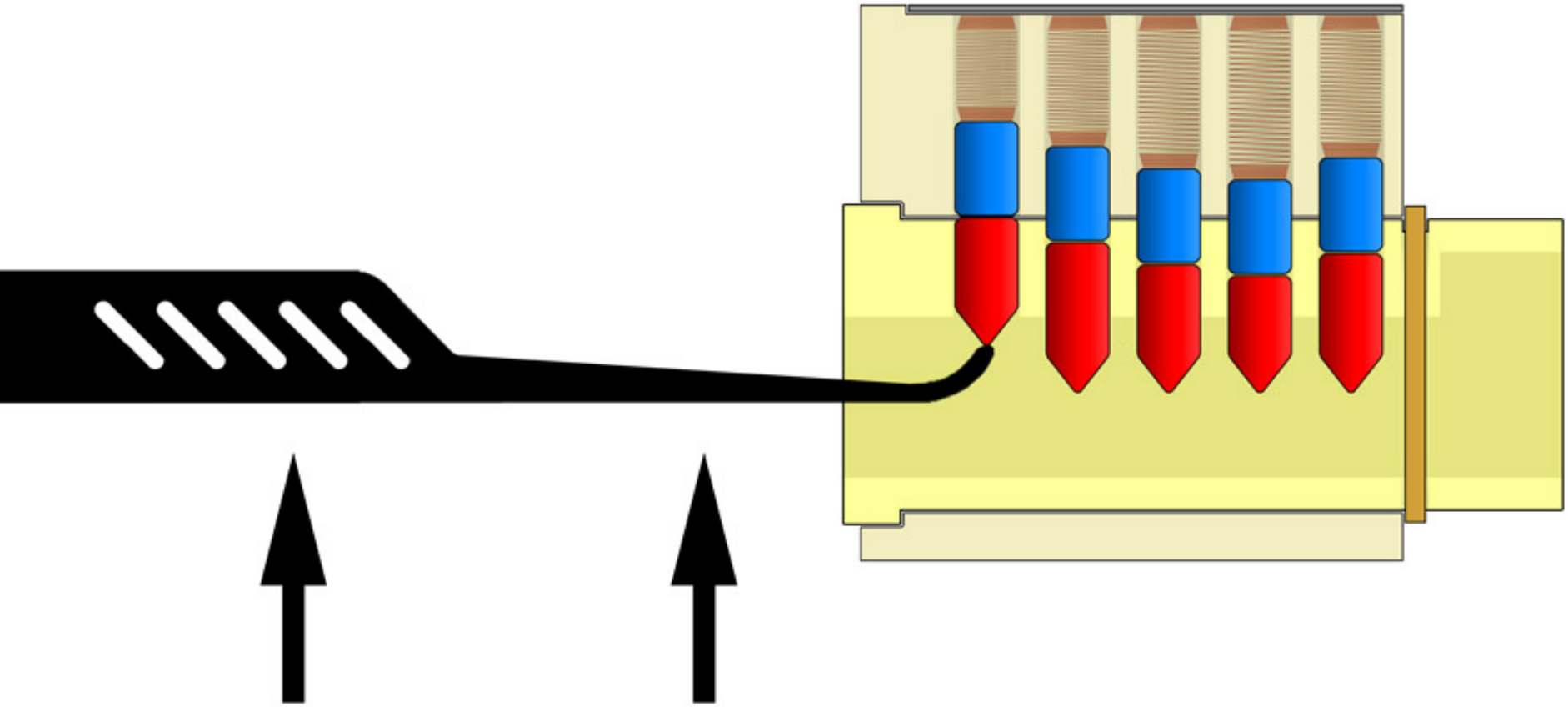
Starter Exercises



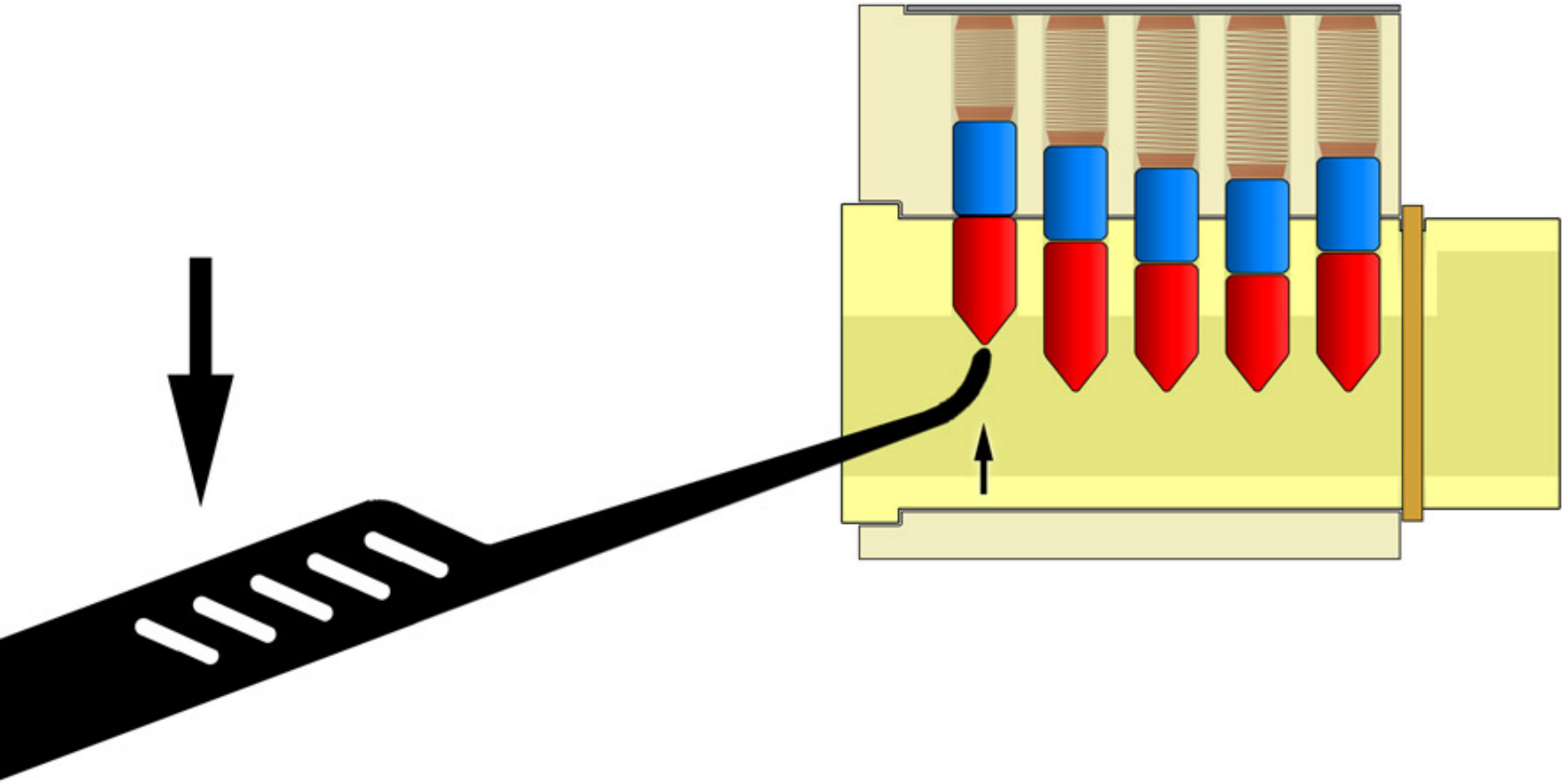
Starter Exercises



Direct Lifting



Rocking Lifting

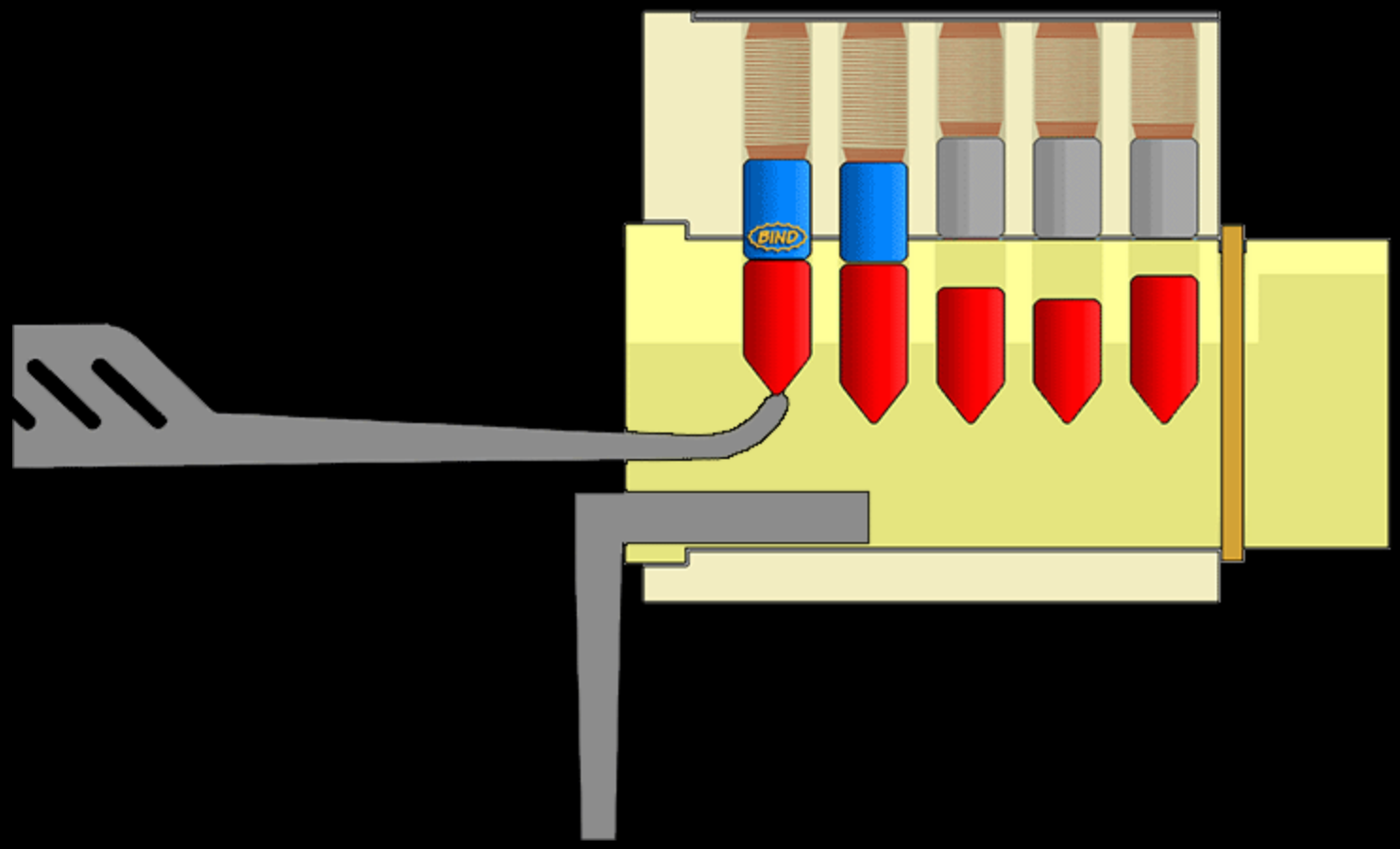


The Two Most Important Things…

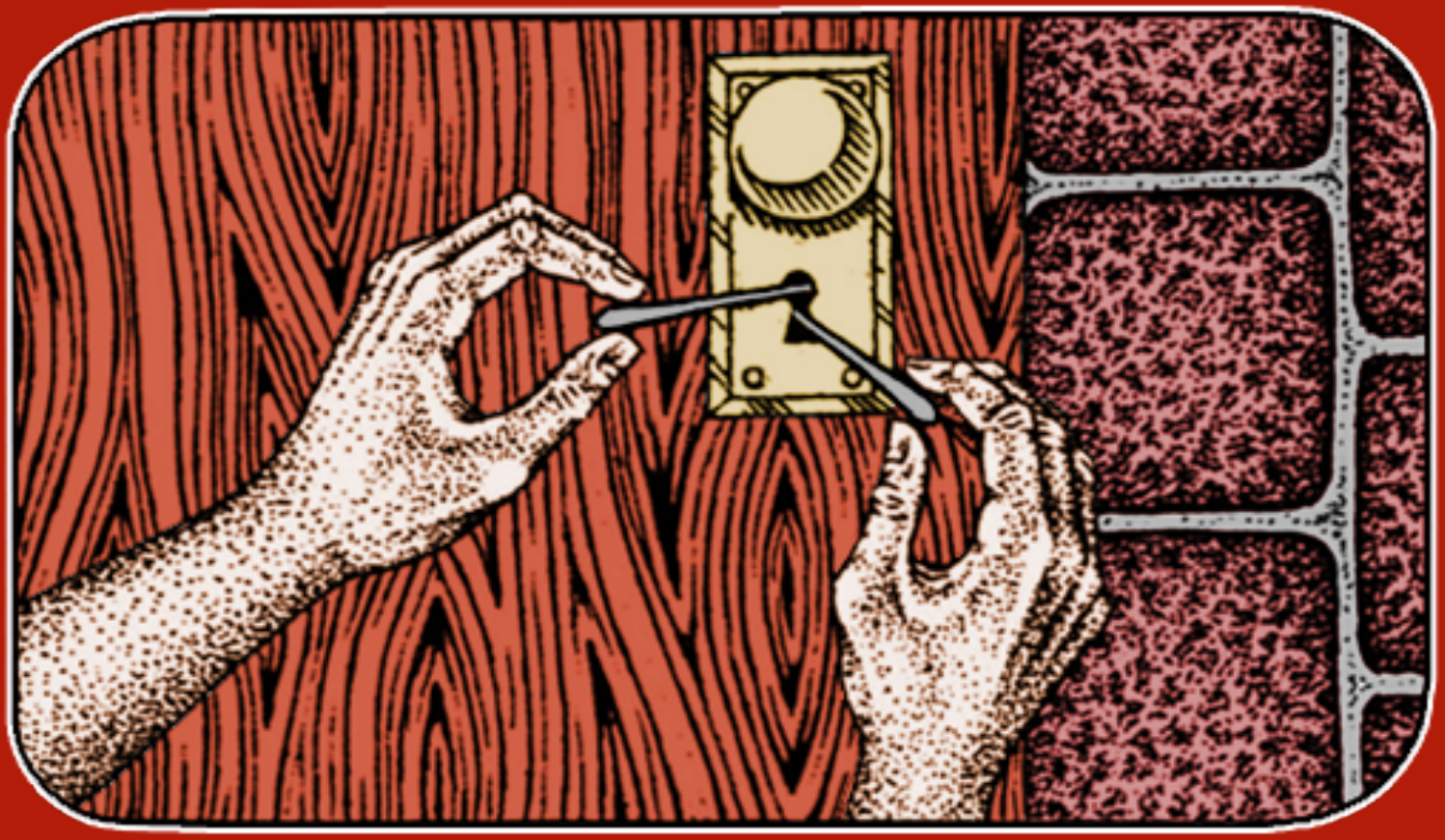
RELAX

The Two Most Important Things…

Questions?



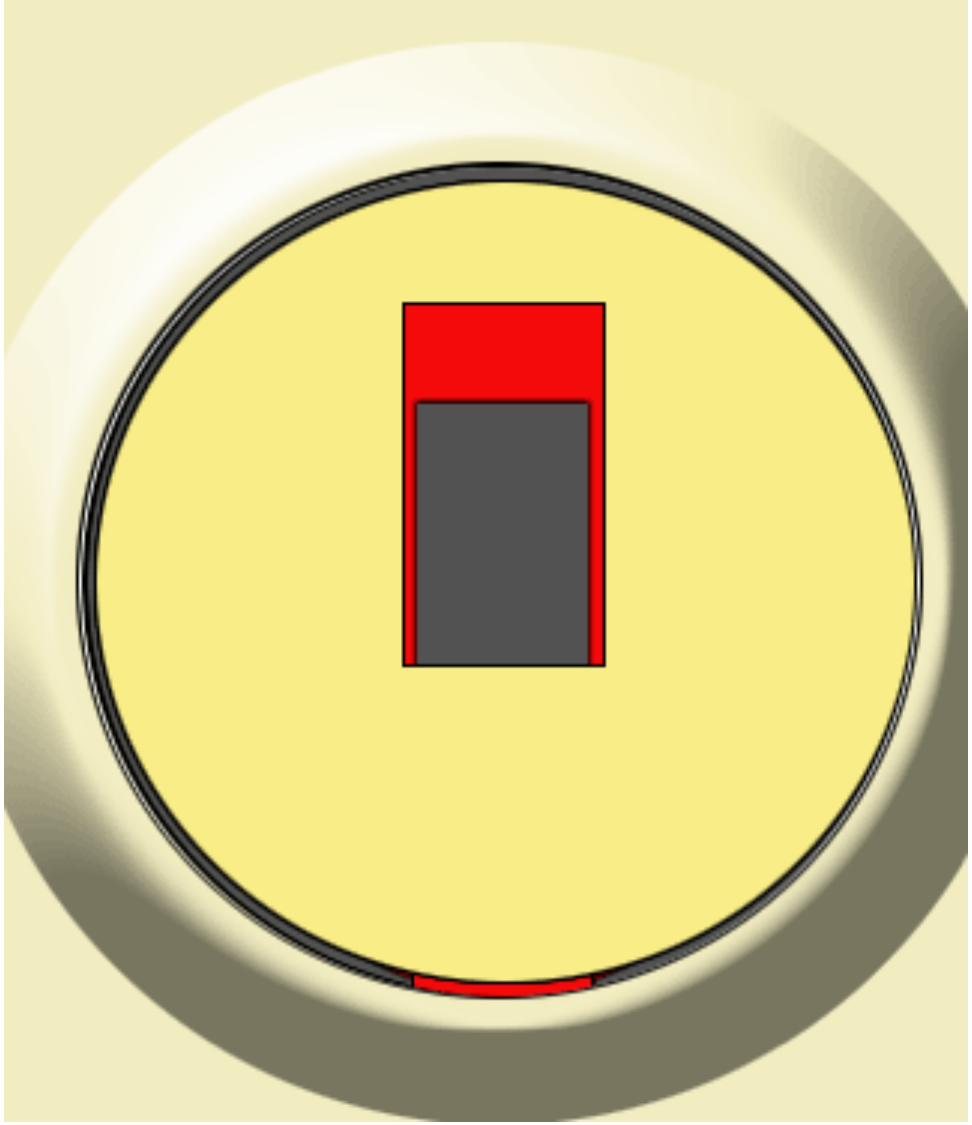
Wafer Locks



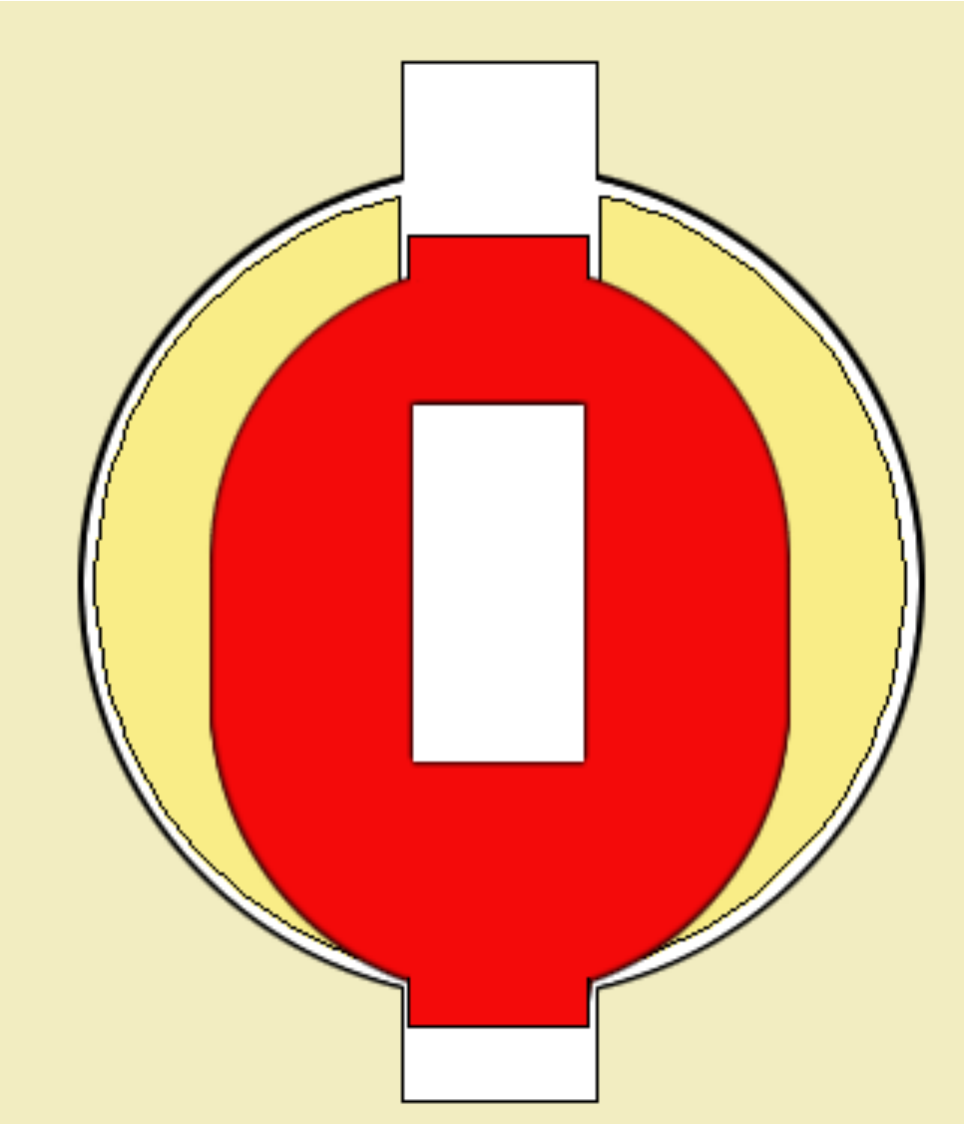
Wafer Locks

Wafer Locks

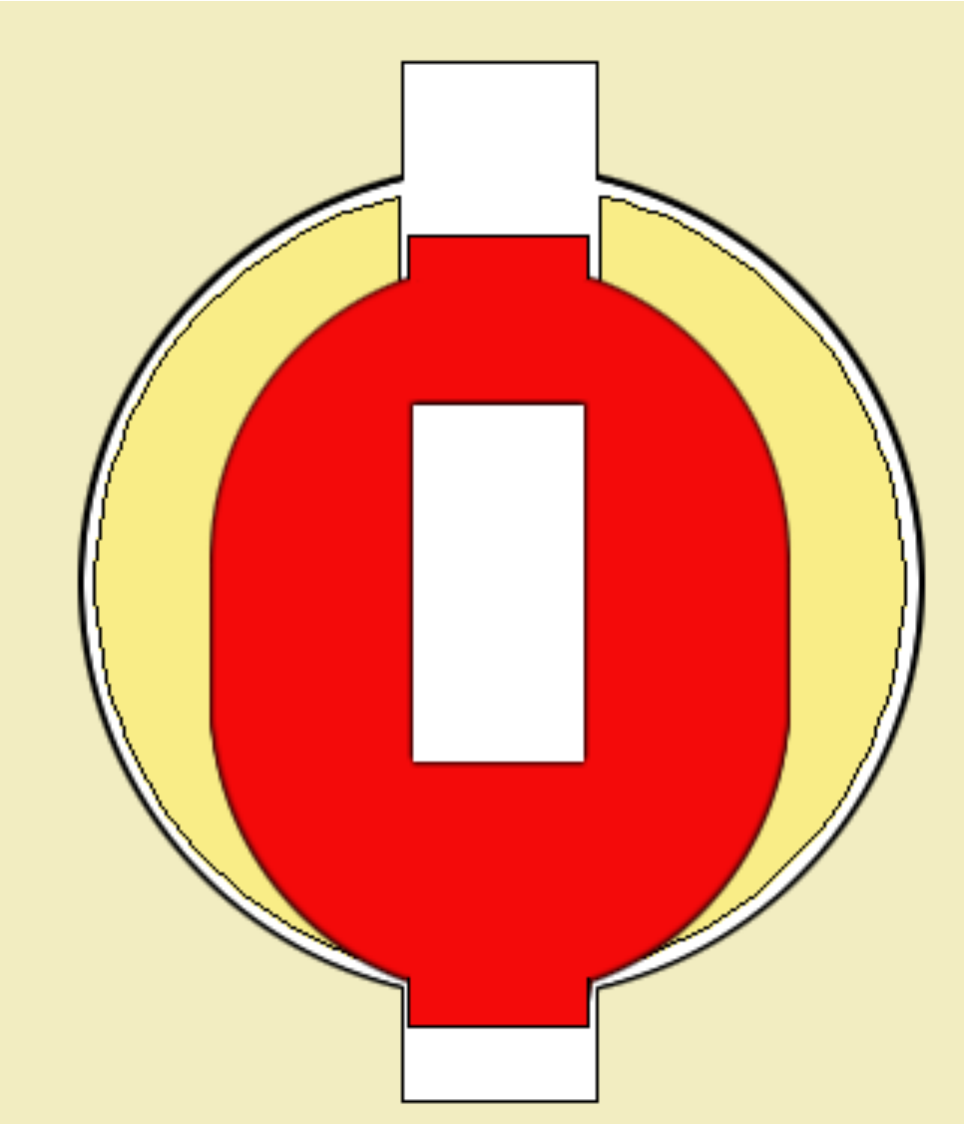
Wafer Locks – Outer View



Wafer Locks – Inner View



Wafer Locks – Operating Action

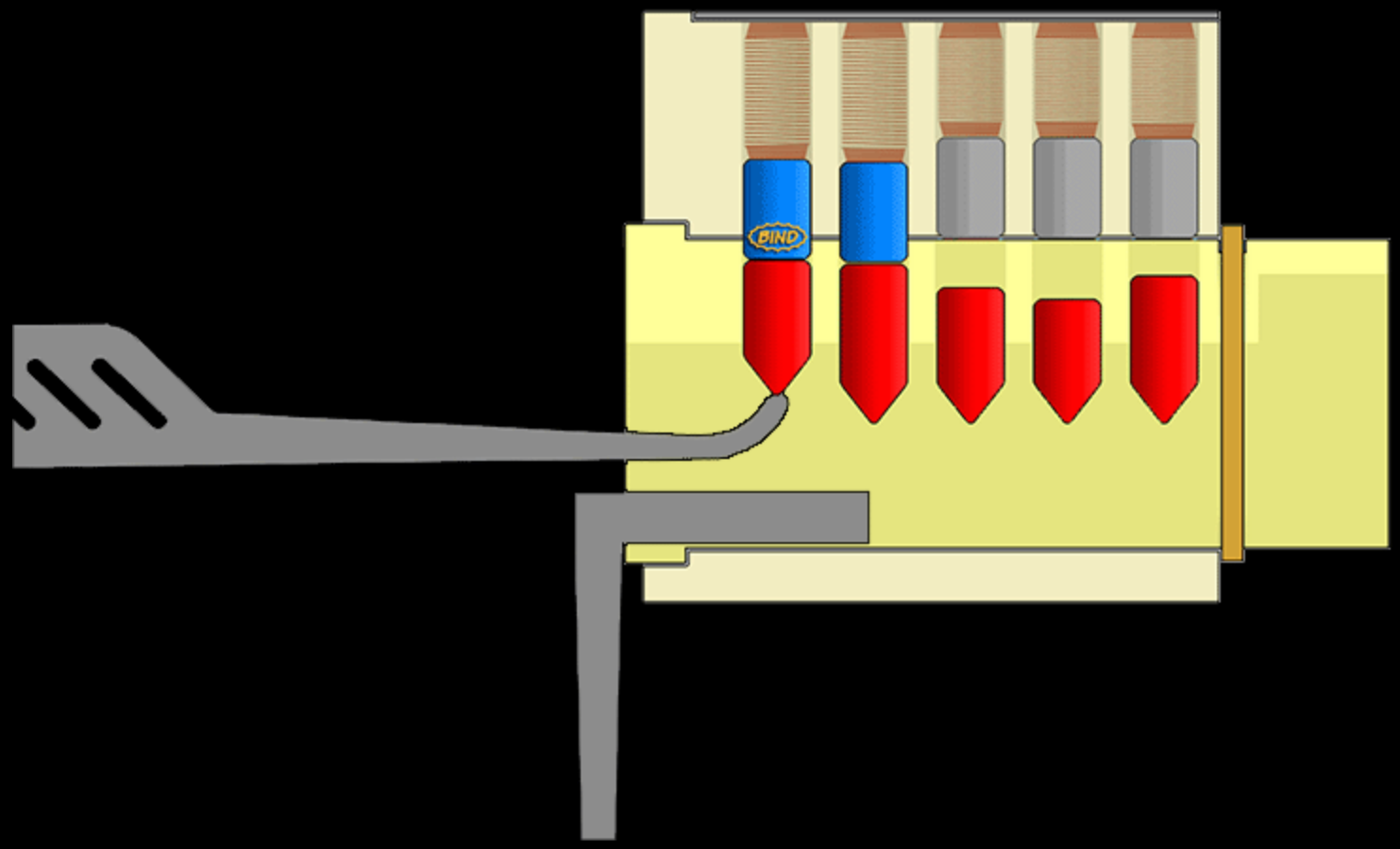


Wafer Lock Usage

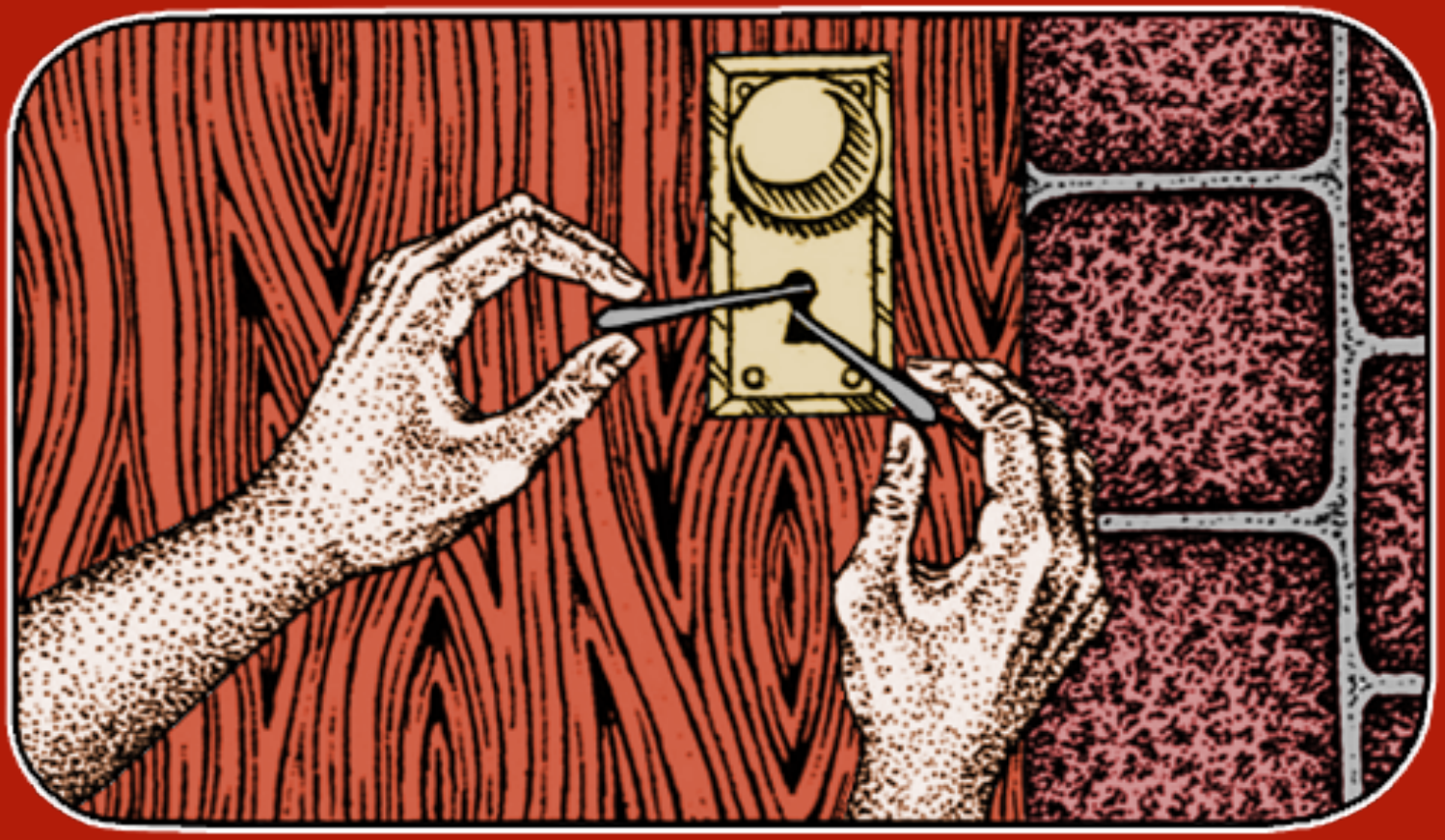
Wafer Lock Usage

Wafer Lock Usage

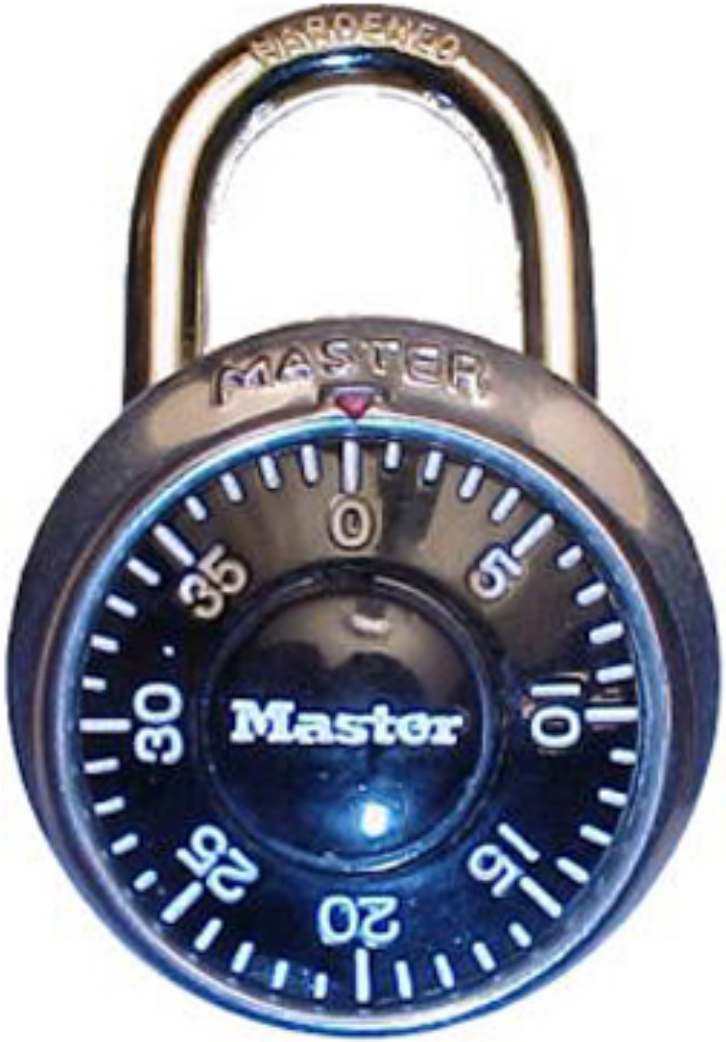
Questions?



Combination Locks



Combination Locks



If You Are Doing This…

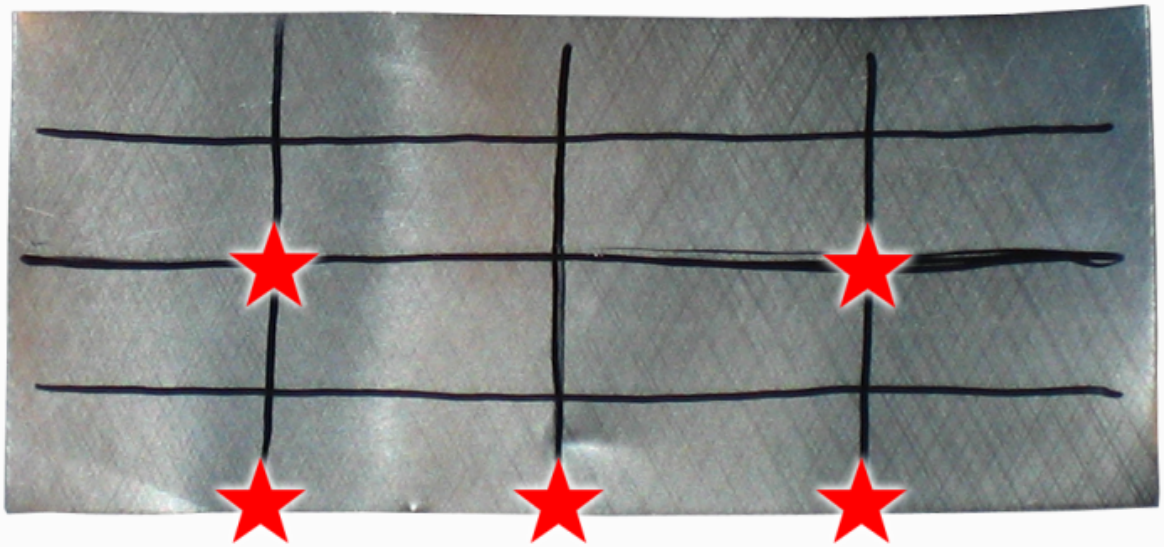
If You Are Doing This… … What You Are Saying Is This

Padlock Shims

Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims



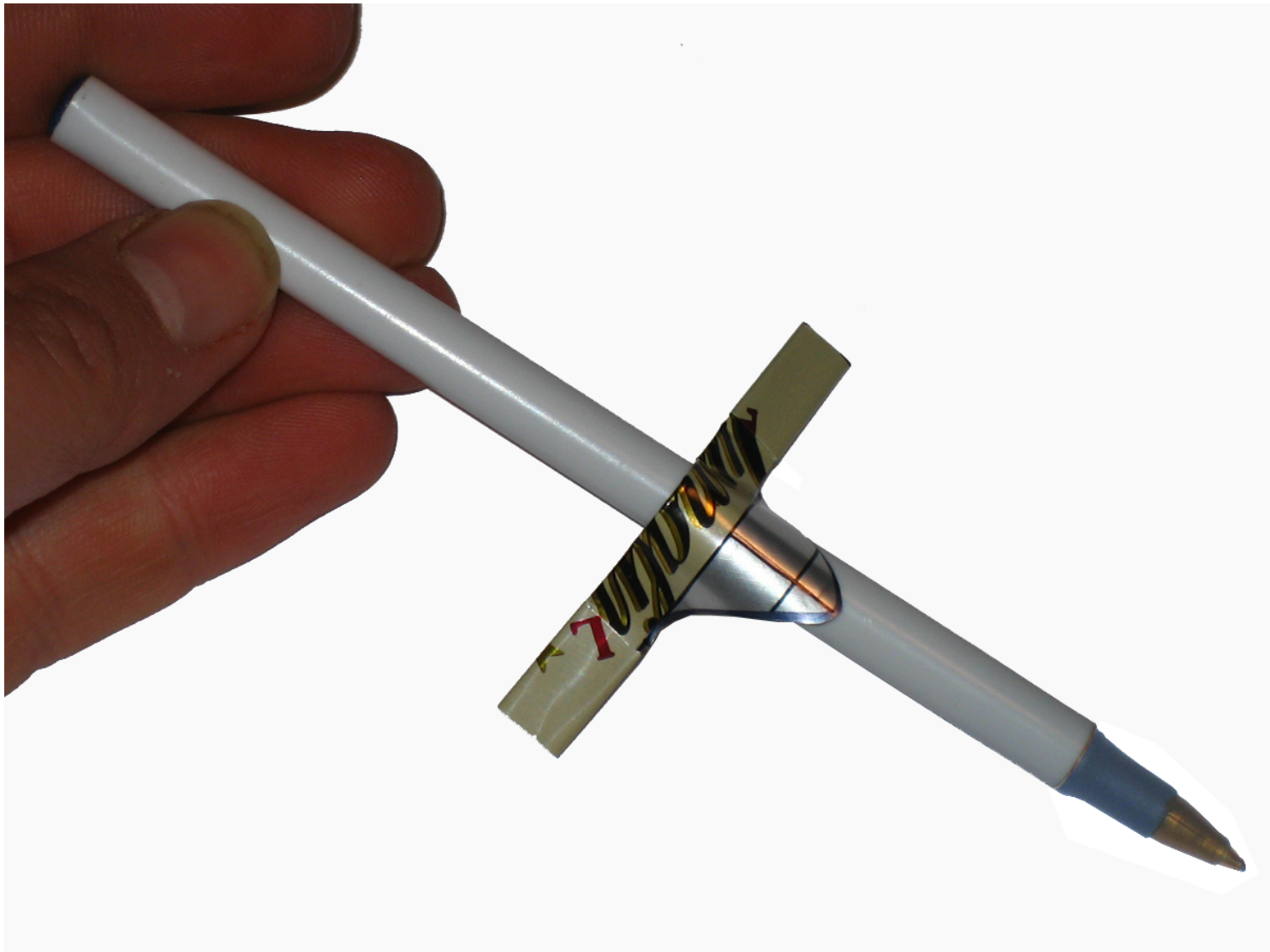
Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims



Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

Homebrew Padlock Shims

A tale of Homebrew Shims

A tale of Homebrew Shims

A tale of Homebrew Shims

A tale of Homebrew Shims

A tale of Homebrew Shims

Single Latch or Dual Latch ?

Shim-Proof Padlocks… Double-Ball Mechanism

Shim-Proof Padlocks… Double-Ball Mechanism

Shim-Proof Padlocks… Double-Ball Mechanism

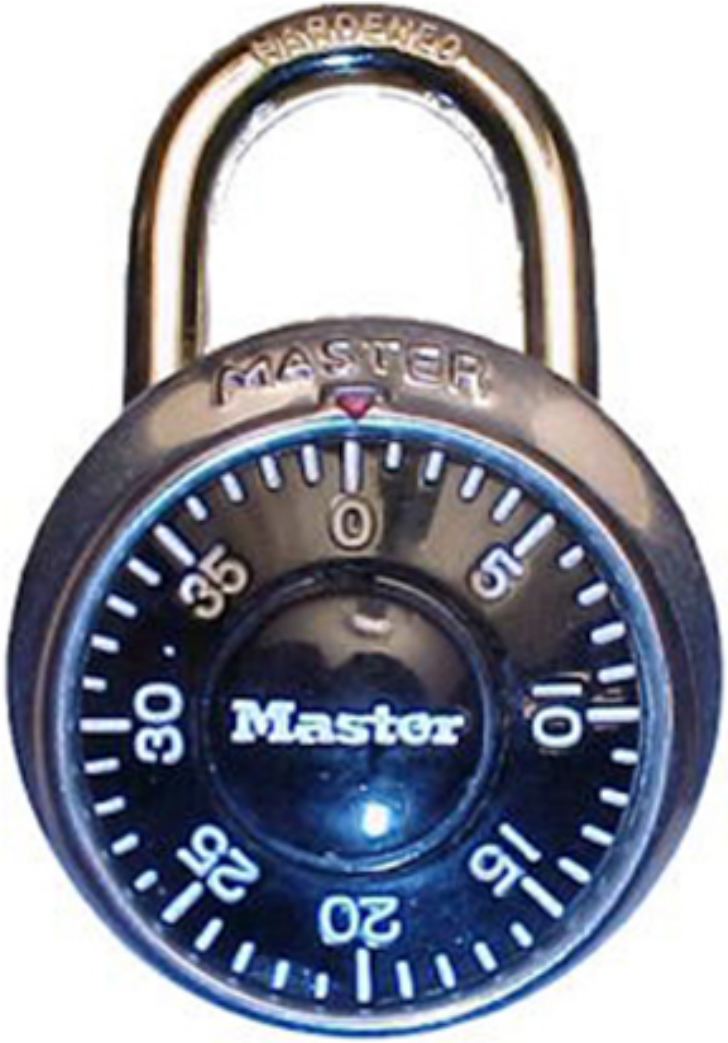
Shim-Proof Padlocks… Double-Ball Mechanism

Some People Seemingly Don't Know There's a Risk

Some People Seemingly Don't Know There's a Risk

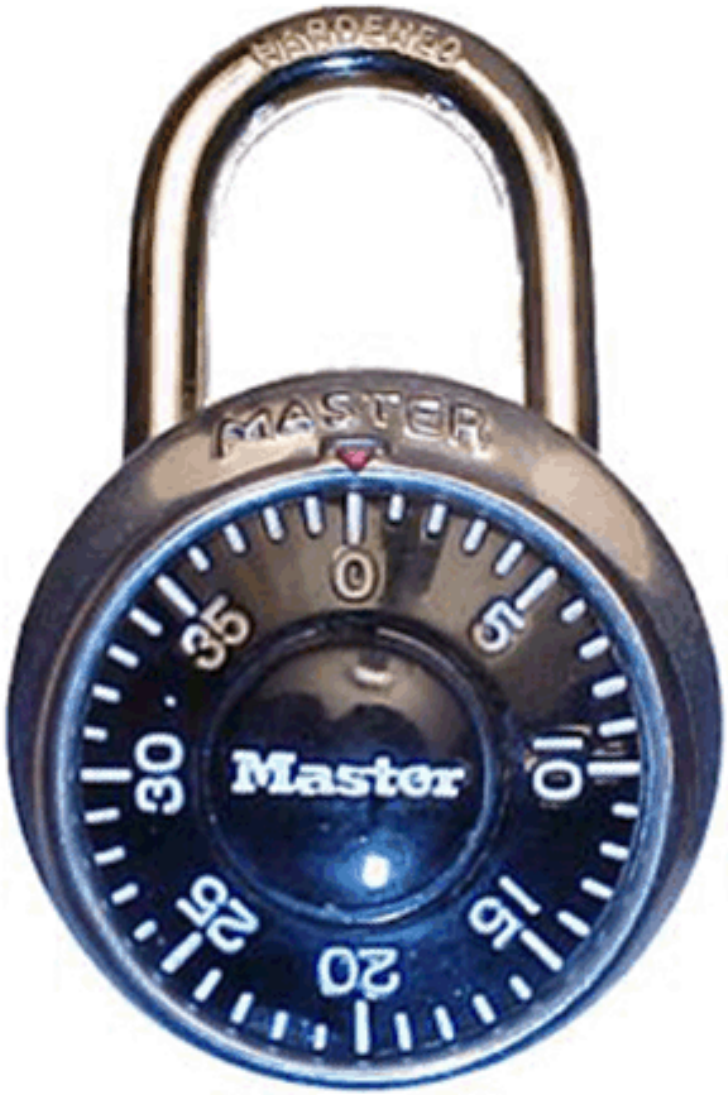
Decoding the Combination?

Decoding the Combination



Decoding the Combination

Decoding the Combination



Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

2½ 12½ 22½ 32½

Decoding the Combination

2½ 12½ 22½ ? 32½

Decoding the Combination

2½ 12½ 23 ✓ 32½

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

Decoding the Combination

masterlock.xls [Compatibility Mode] - Microsoft Excel

ThreeThird | 23

3rd Number	"Magic" Number	1st Number Possibilities	2nd Number Possibilities
23	3	3	1
		7	5
		11	9
		15	13
		19	17
		23	21
		27	25
		31	29
		35	33
		39	37
3-1-23	15-1-23	27-1-23	39-1-23
3-5-23	15-5-23	27-5-23	39-5-23
3-9-23	15-9-23	27-9-23	39-9-23
3-13-23	15-13-23	27-13-23	39-13-23
3-17-23	15-17-23	27-17-23	39-17-23
3-21-23	15-21-23	27-21-23	39-21-23
3-25-23	15-25-23	27-25-23	39-25-23
3-29-23	15-29-23	27-29-23	39-29-23
3-33-23	15-33-23	27-33-23	39-33-23
3-37-23	15-37-23	27-37-23	39-37-23
7-1-23	19-1-23	31-1-23	
7-5-23	19-5-23	31-5-23	
7-9-23	19-9-23	31-9-23	
7-13-23	19-13-23	31-13-23	
7-17-23	19-17-23	31-17-23	
7-21-23	19-21-23	31-21-23	
7-25-23	19-25-23	31-25-23	
7-29-23	19-29-23	31-29-23	
7-33-23	19-33-23	31-33-23	
7-37-23	19-37-23	31-37-23	
11-1-23	23-1-23	35-1-23	
11-5-23	23-5-23	35-5-23	
11-9-23	23-9-23	35-9-23	
11-13-23	23-13-23	35-13-23	
11-17-23	23-17-23	35-17-23	
11-21-23	23-21-23	35-21-23	
11-25-23	23-25-23	35-25-23	
11-29-23	23-29-23	35-29-23	
11-33-23	23-33-23	35-33-23	
11-37-23	23-37-23	35-37-23	

First Number Known | Second Number Known | Third Number Known

http://deviating.net/lockpicking/media/masterlock.xls

Decoding Multi-Wheel Combinations

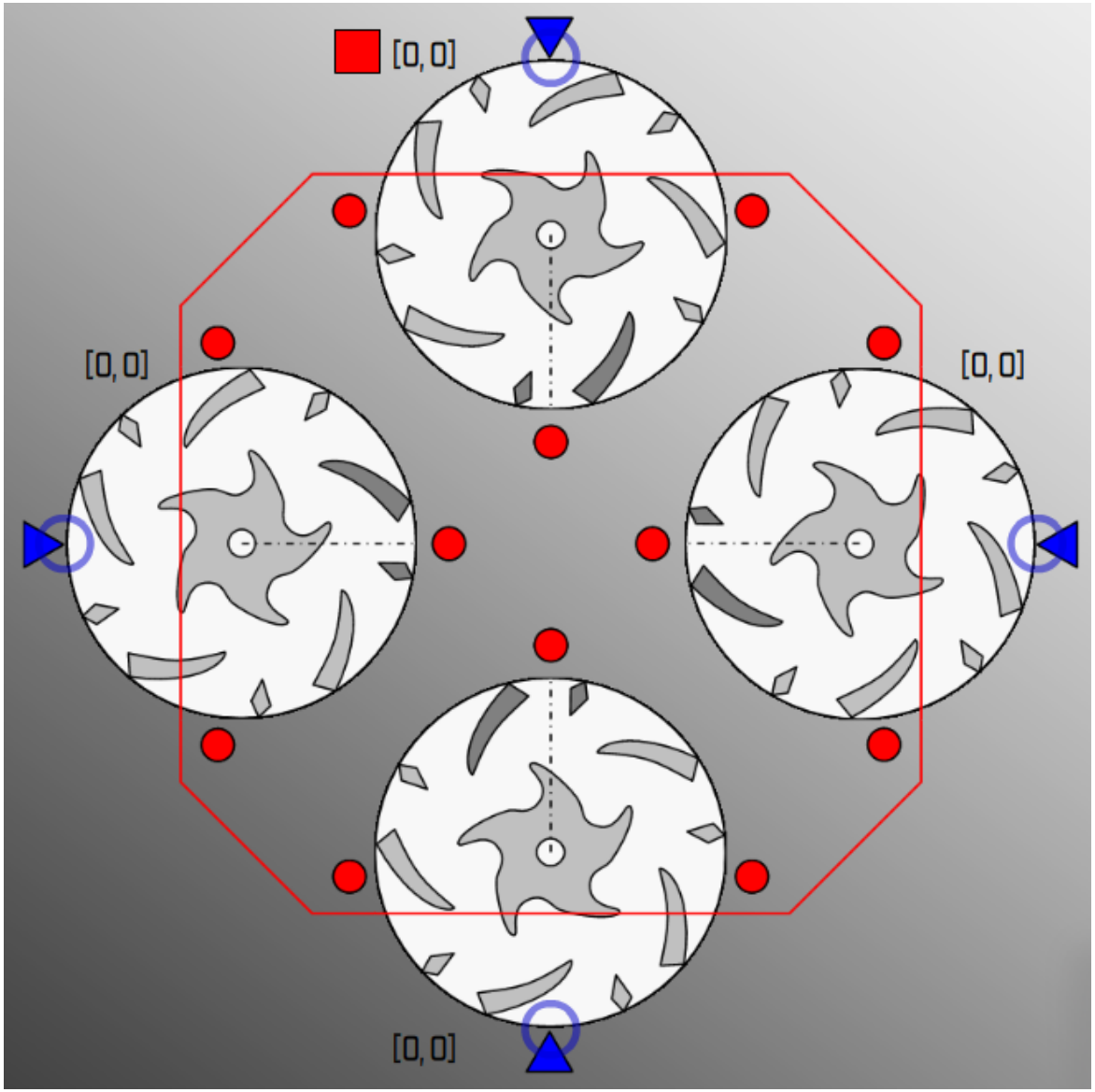
A New Kind of Combination Padlock

A New Kind of Combination Padlock

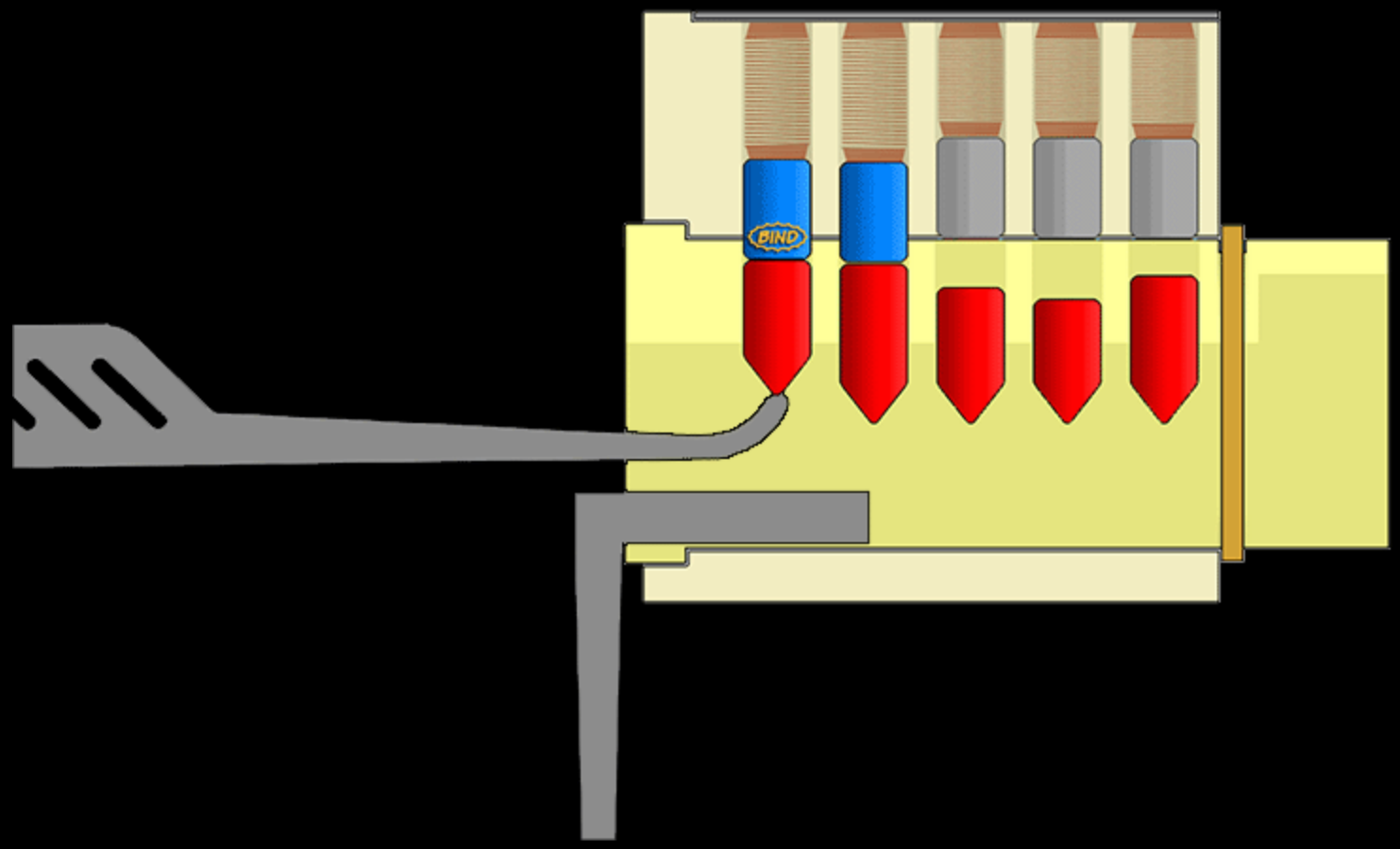
A New Kind of Combination Padlock

A New Kind of Combination Padlock

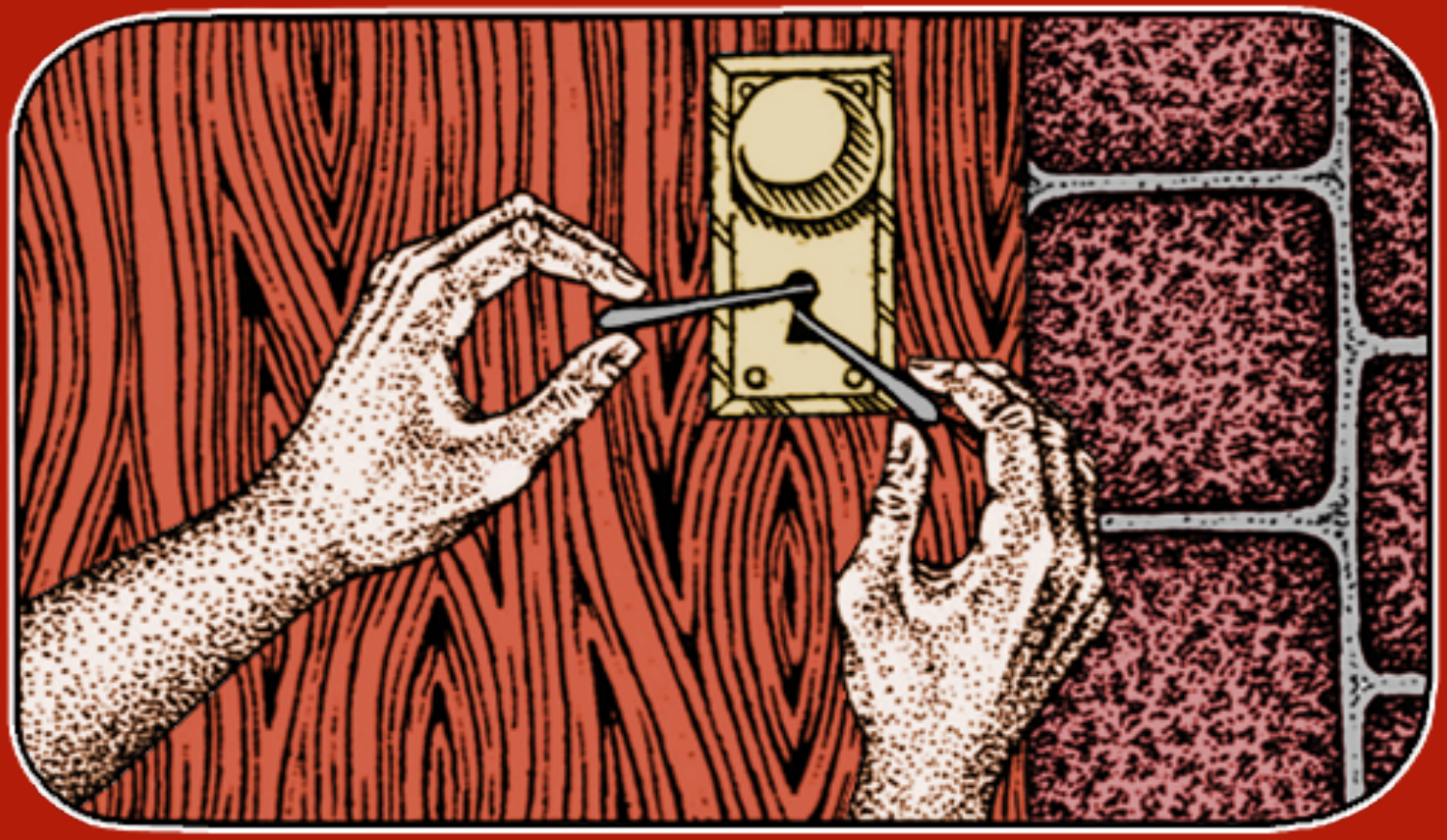
A New Kind of Combination Padlock



Questions?



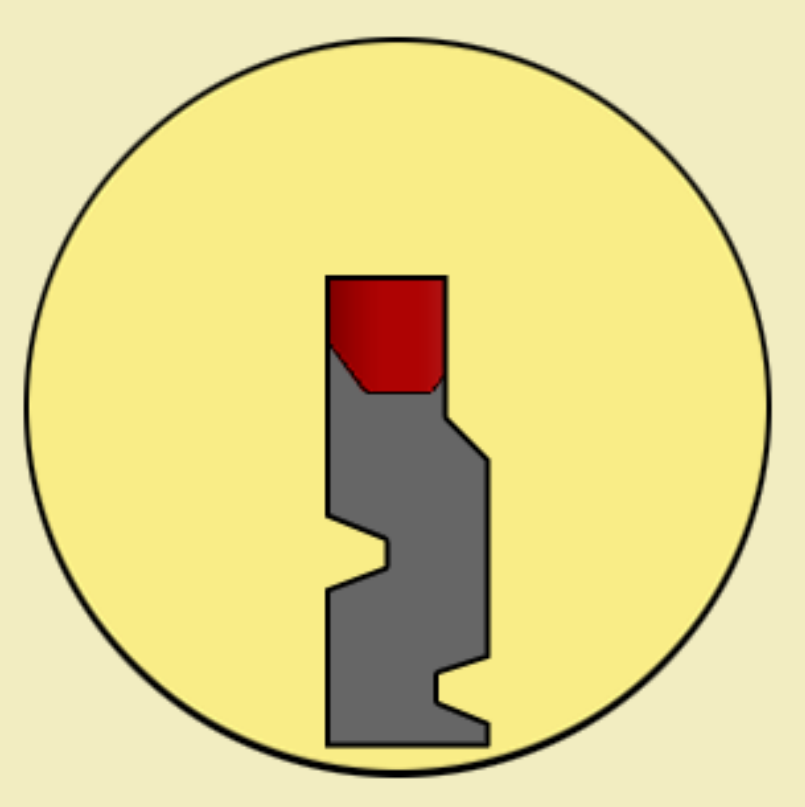
Pick-Resistant Locks



Pick-Resistant Keyways

Simple…

… straight

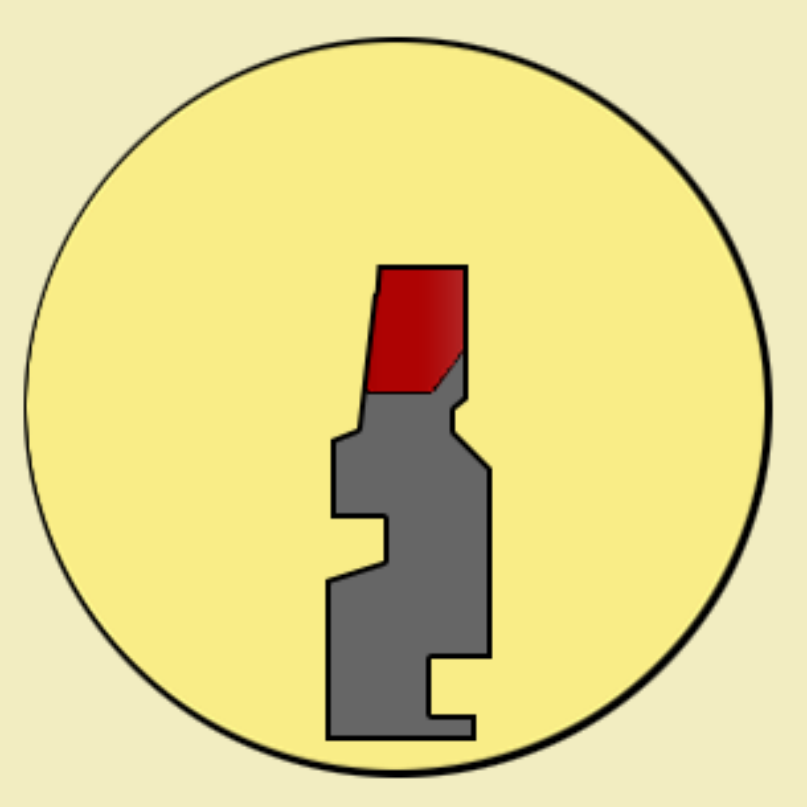


Pick-Resistant Keyways

Simple…

… straight

… straight



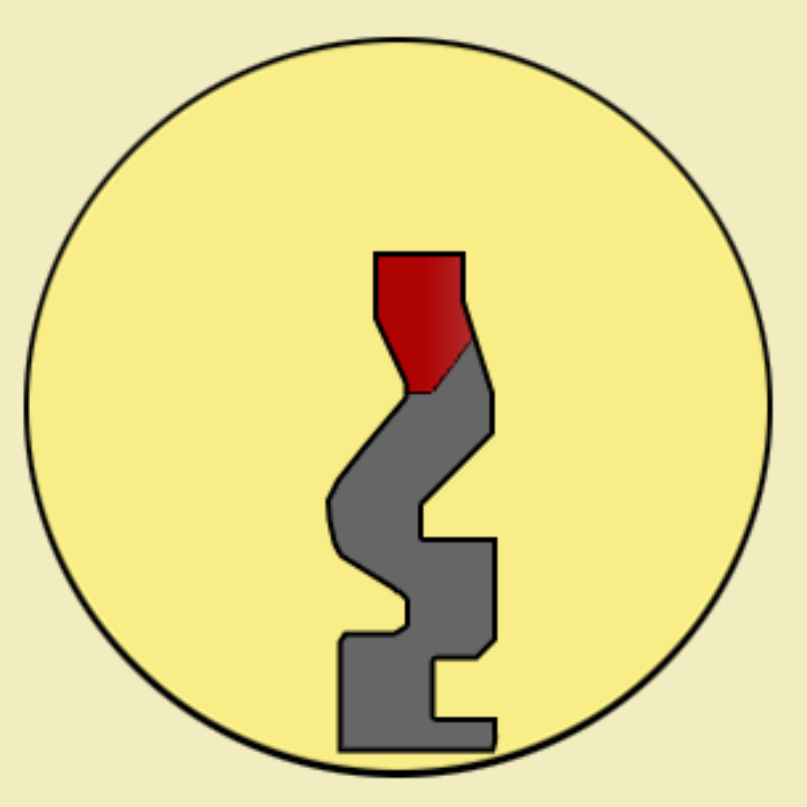
Pick-Resistant Keyways

Simple…

… straight

… straight

… thinner a



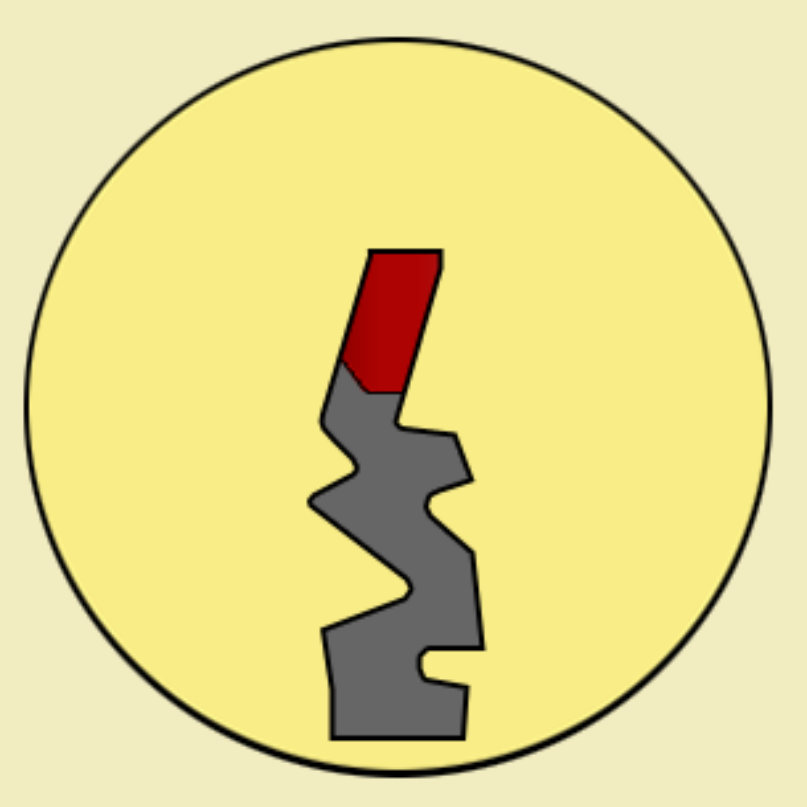
Pick-Resistant Keyways

Simple…

… straight

… straight

… thinner



… lots of ar

Pick-Resistant Keyways

Simple…

… straight and wide Medium…

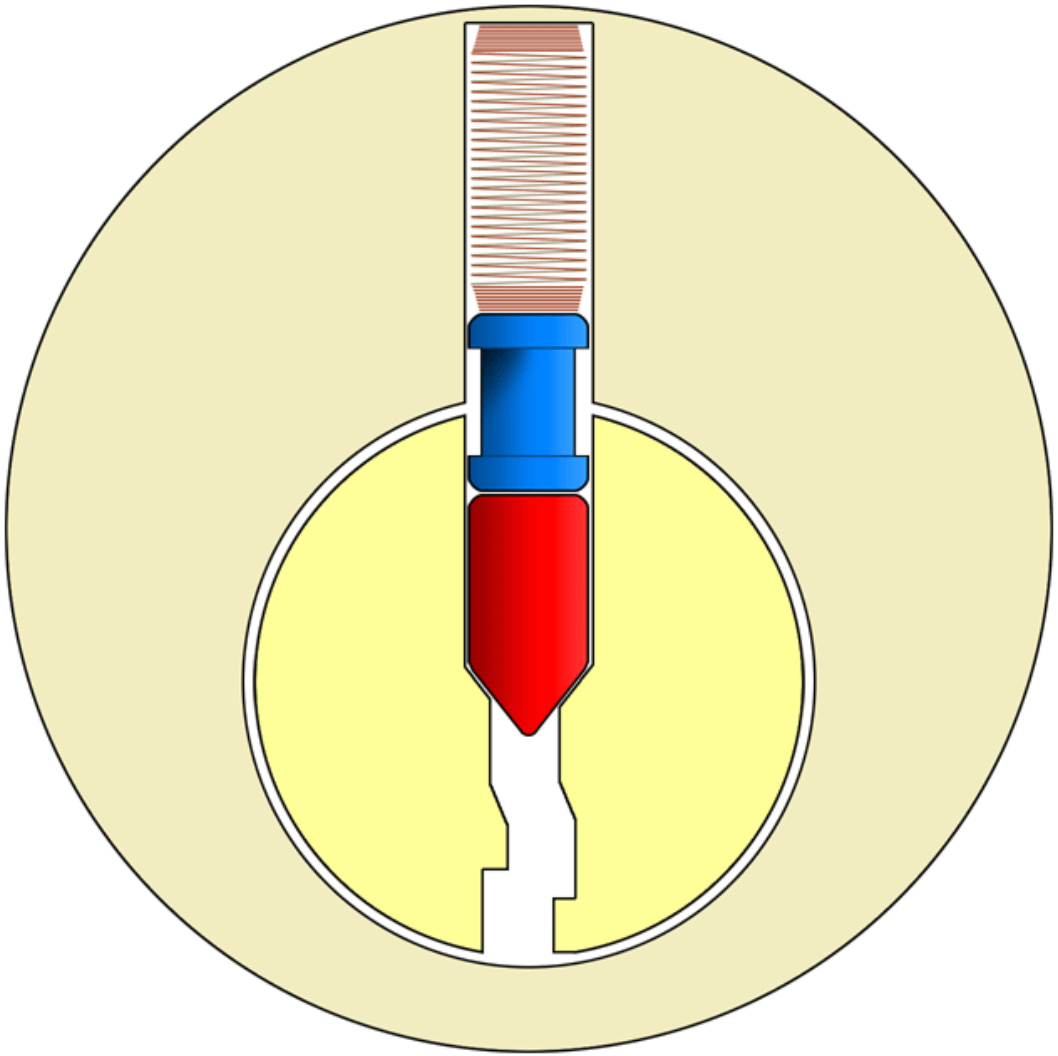
… straight but narrow Complex…

… thinner and curvy Hard…

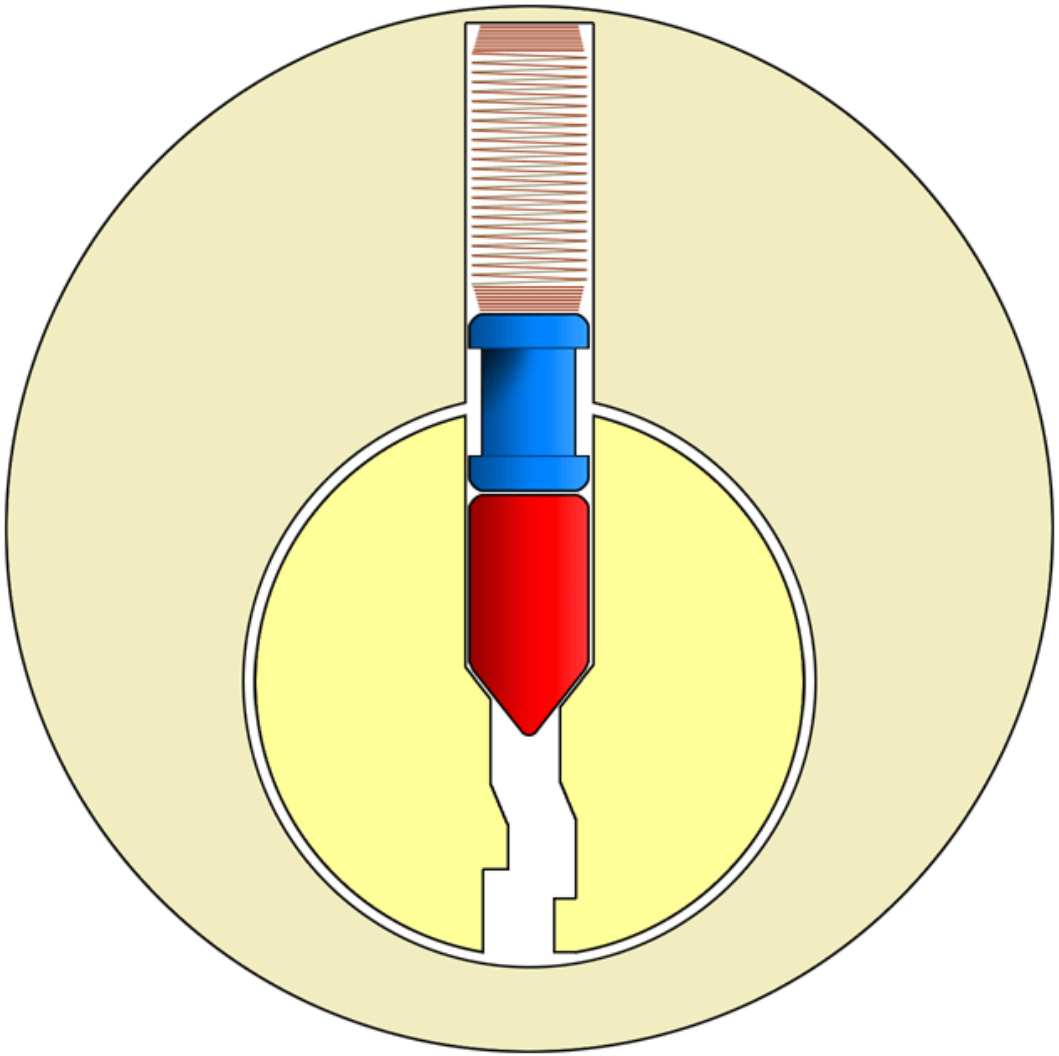
… lots of angles Fiendish…

… overlapping wards

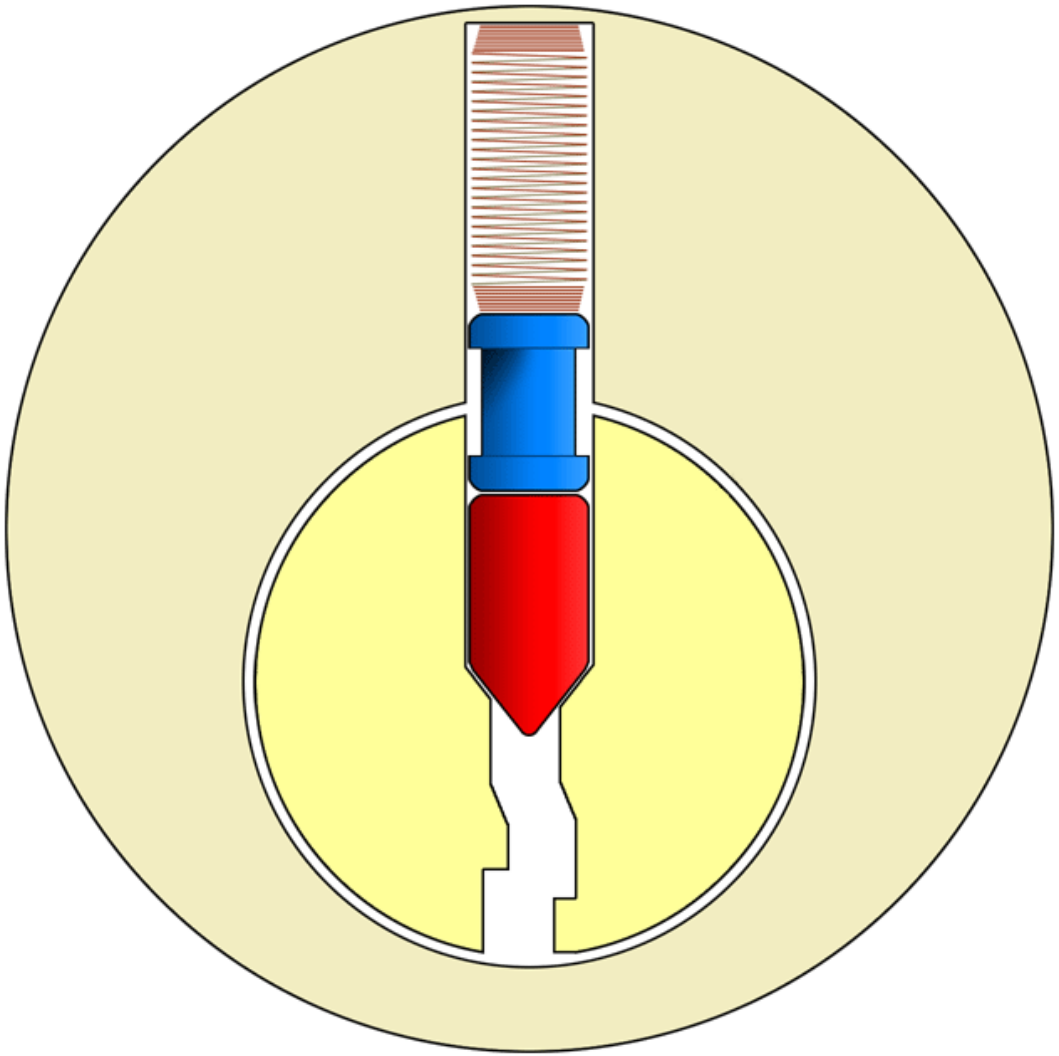
Pick-Resistant Pins



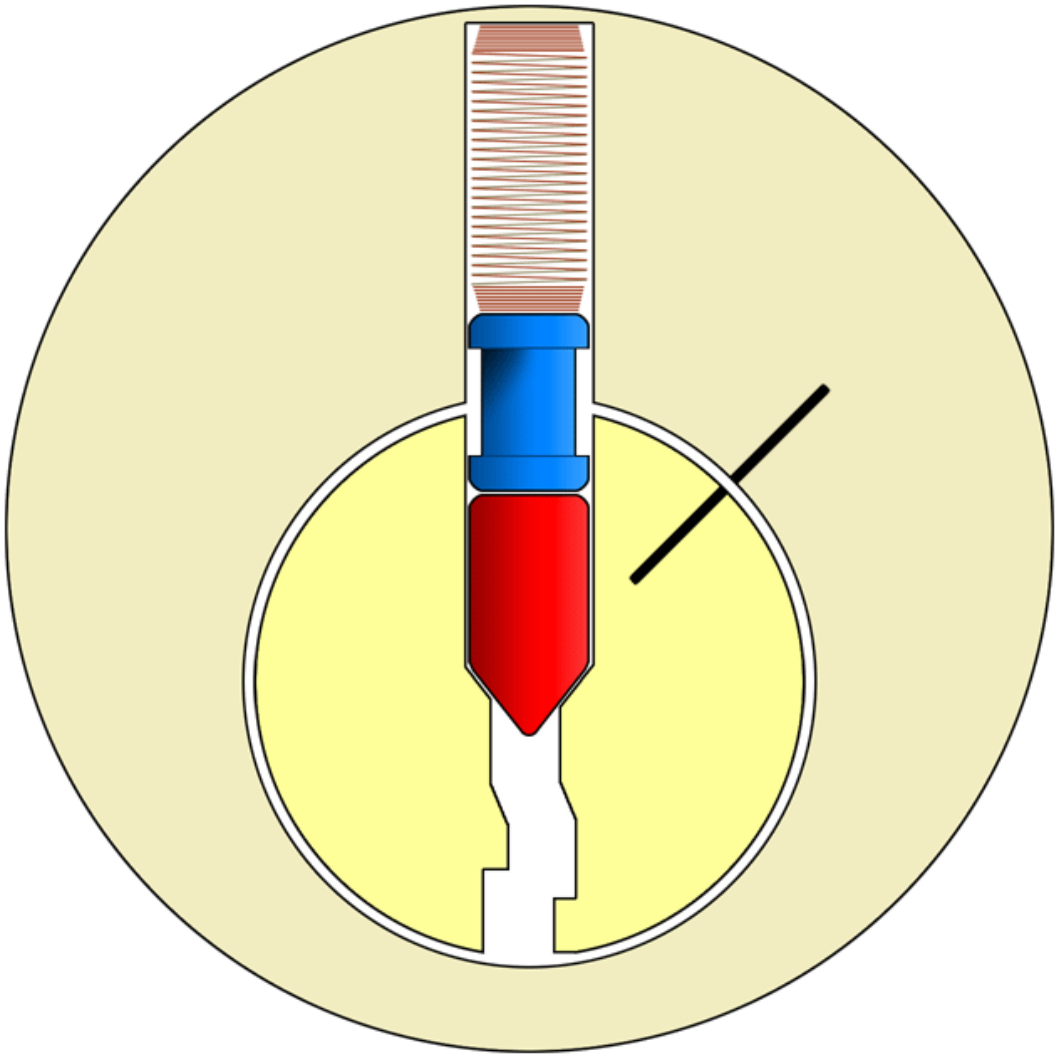
Pick-Resistant Pins – Spool Pin



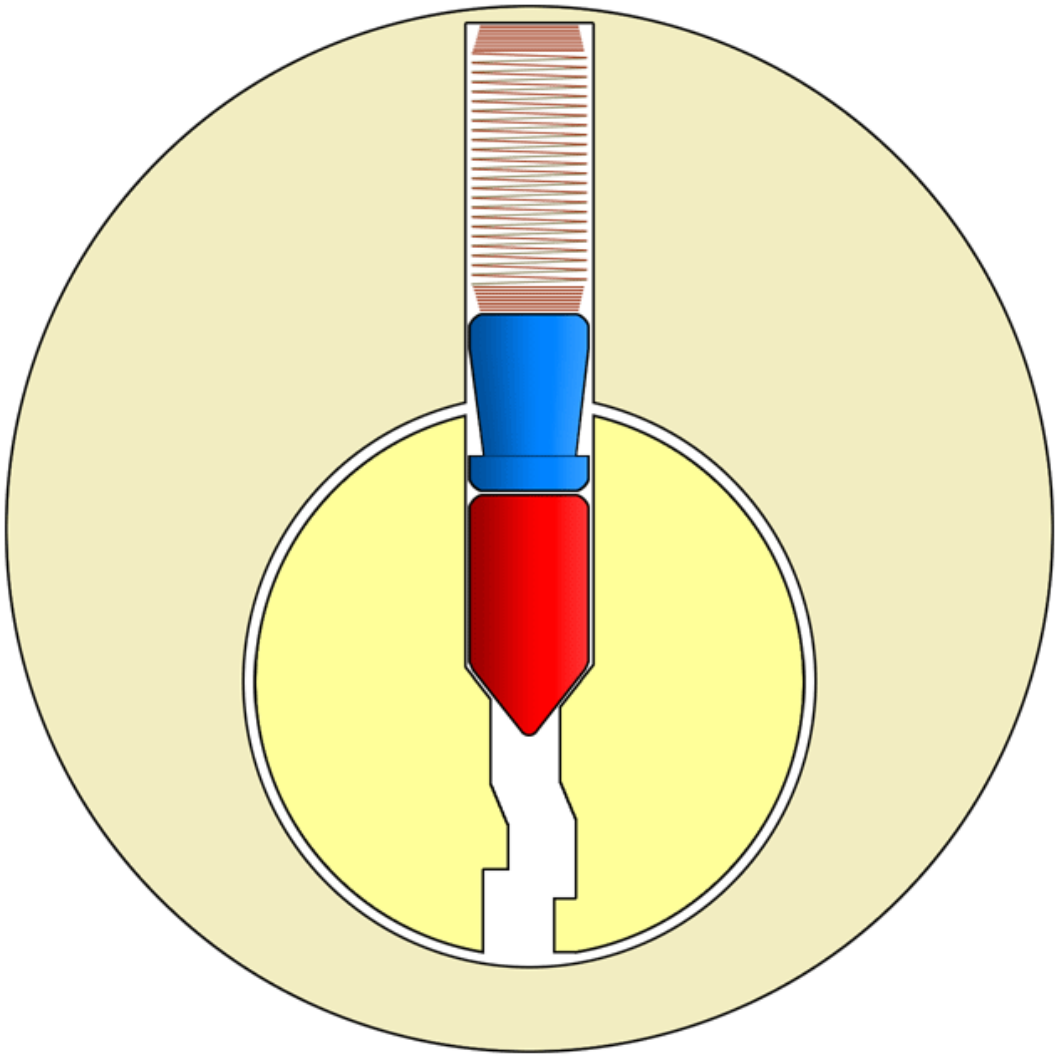
Pick-Resistant Pins – Spool Pin Binding



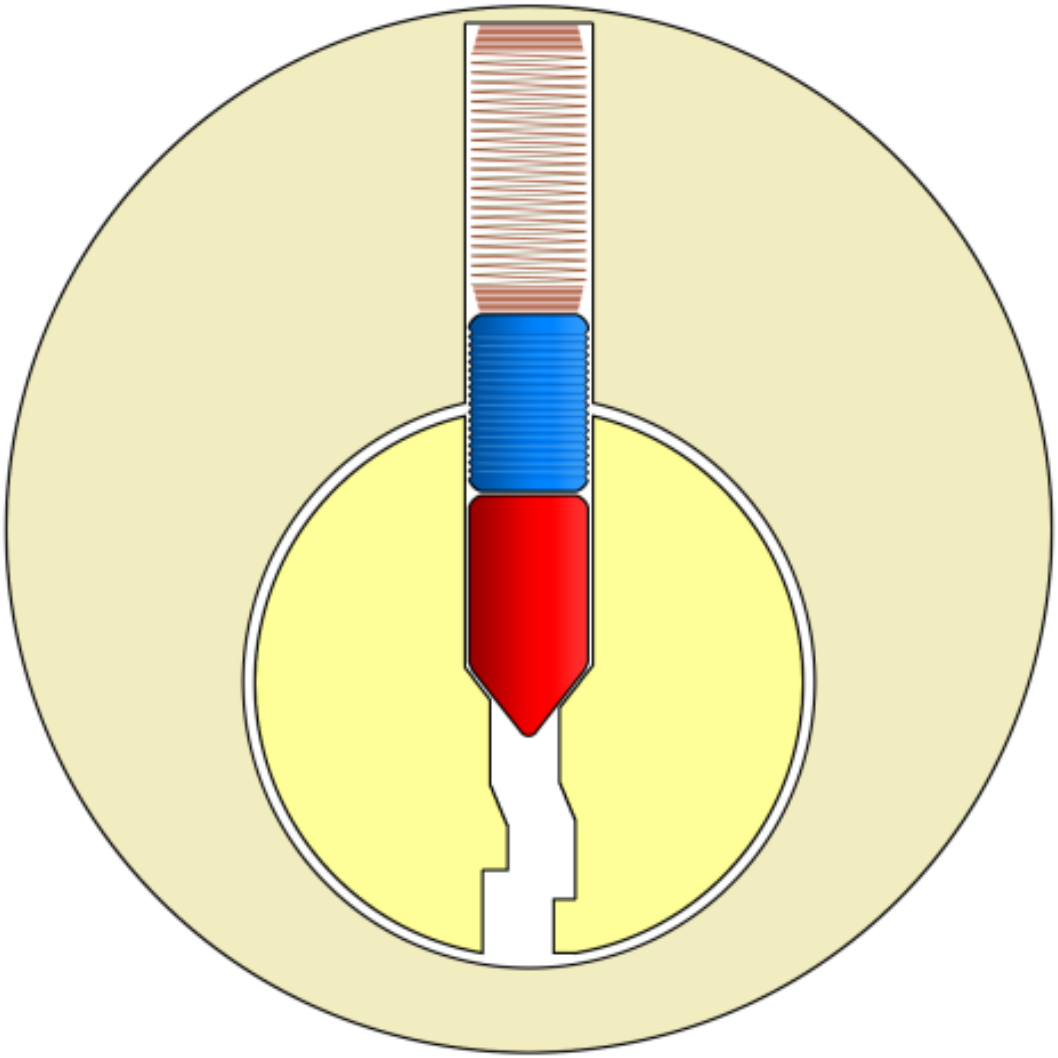
Pick-Resistant Pins – Spool Pin Picking



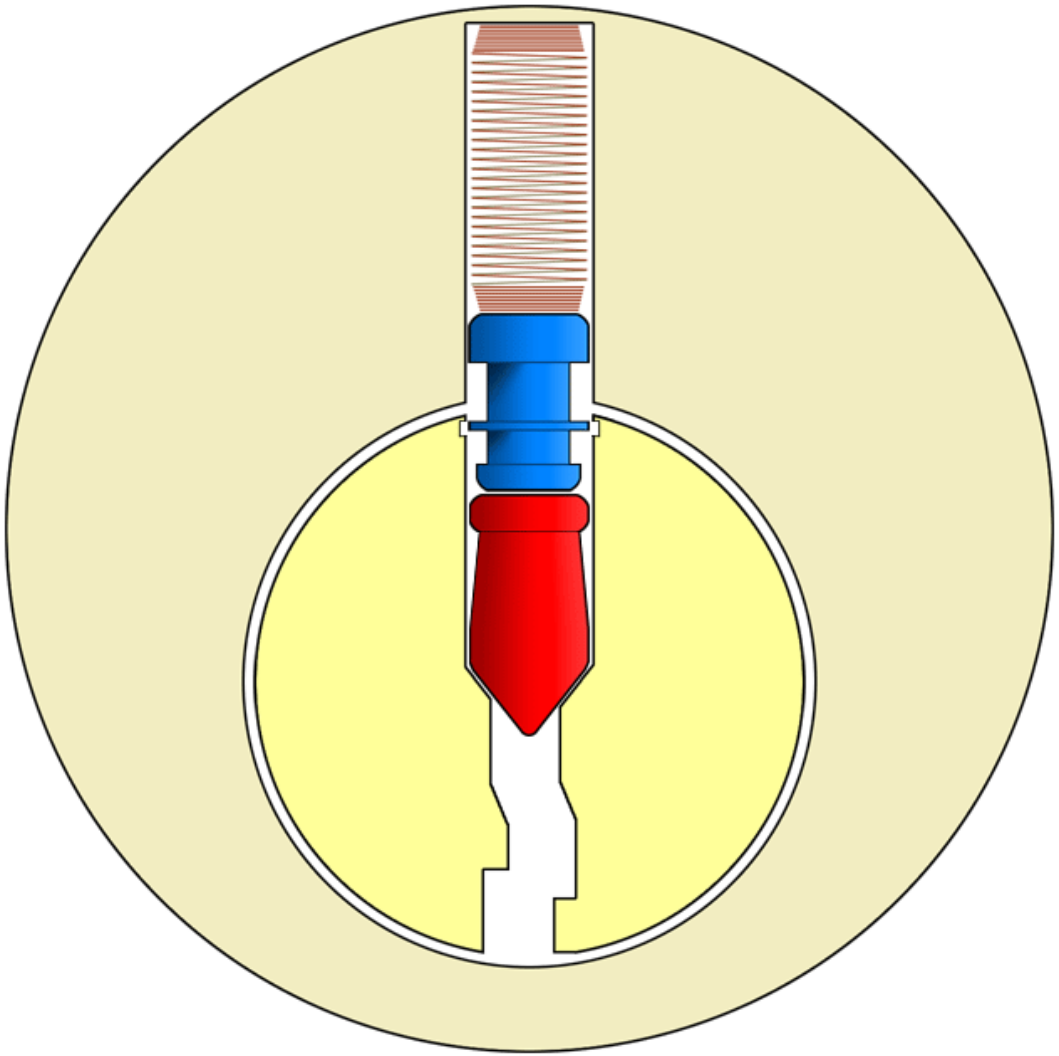
Pick-Resistant Pins – Mushroom Pin



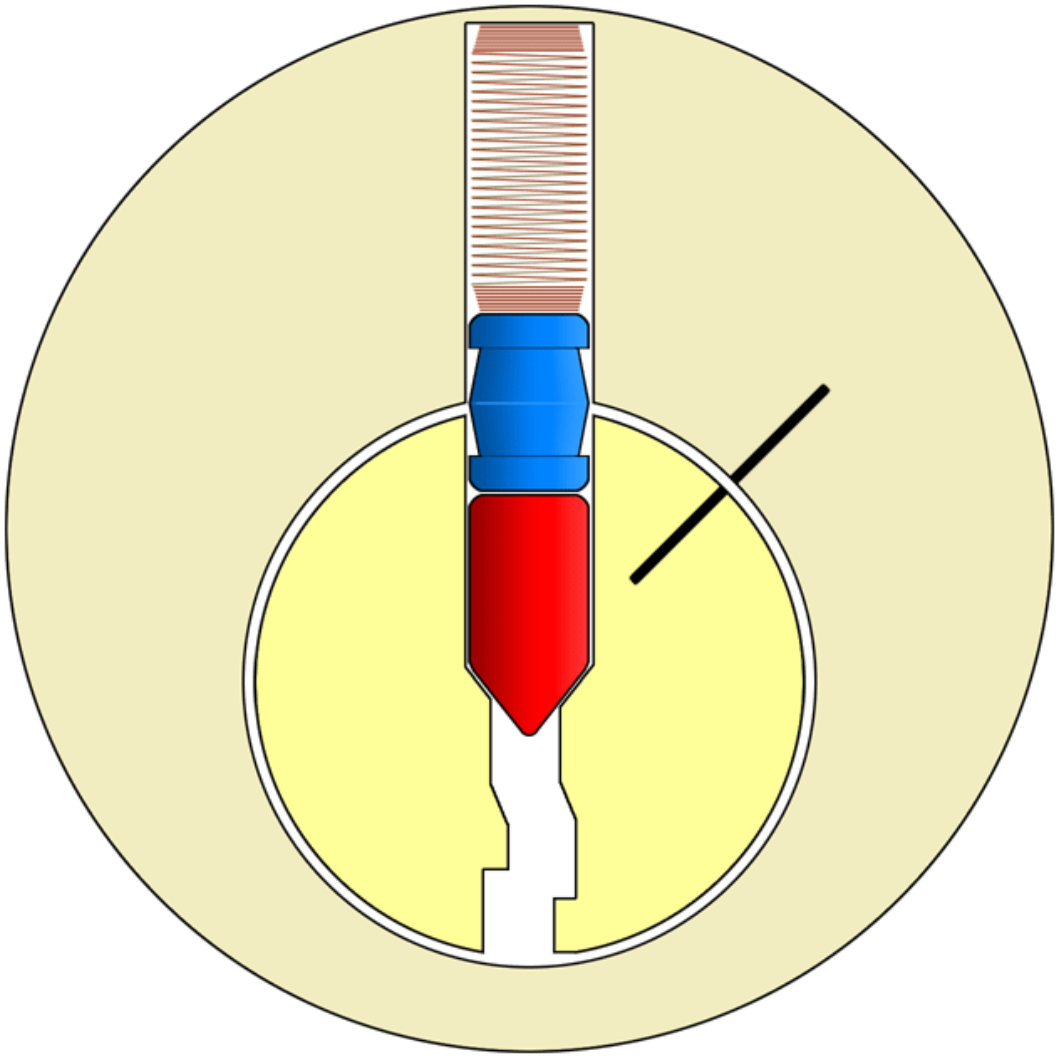
Pick-Resistant Pins – Serrated Pin



Pick-Resistant Pins – ASSA “Sneaky” Pin



Pick-Resistant Pins – TrioVing "Double Mushroom" Pin

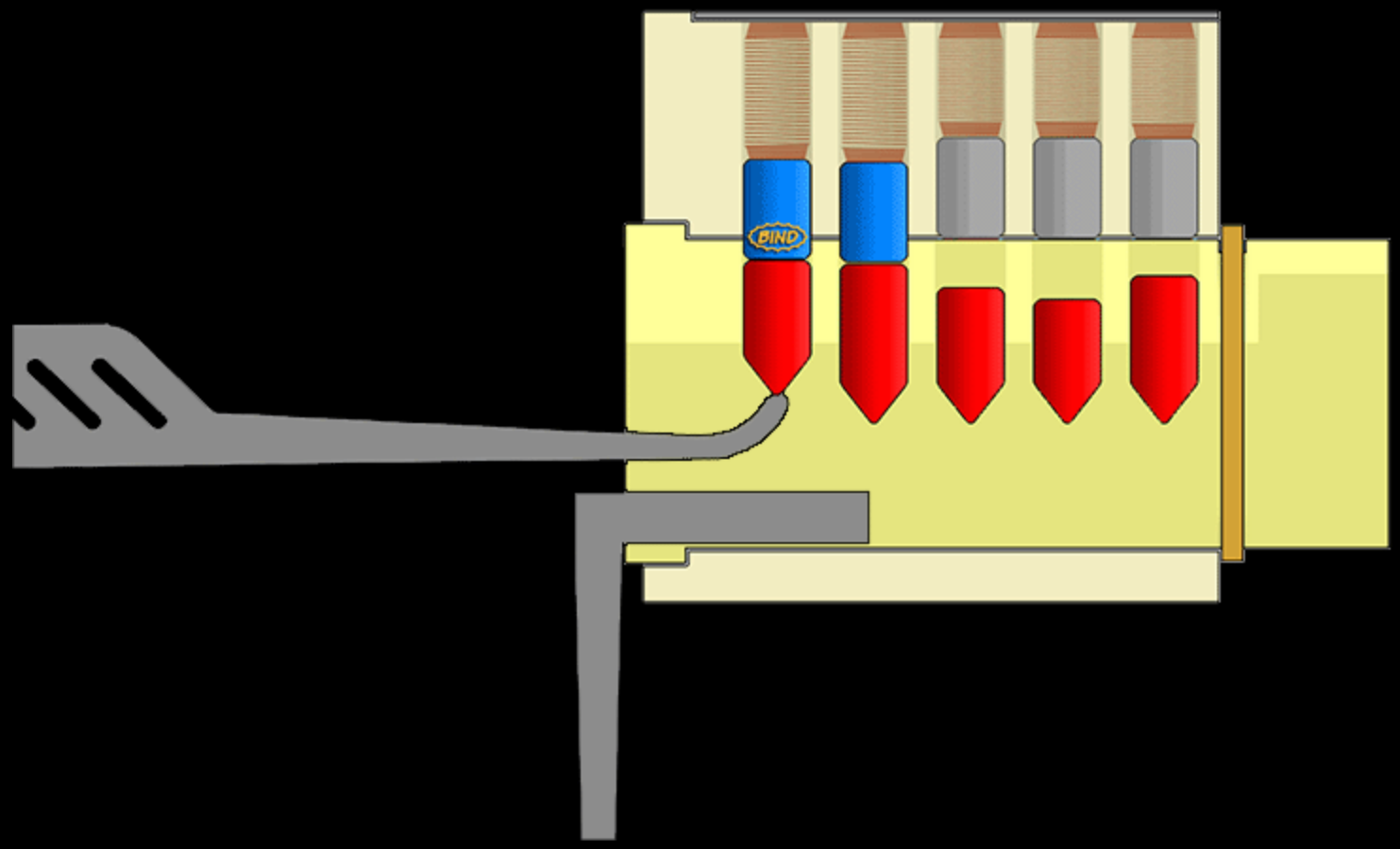


Pick-Resistant Locks

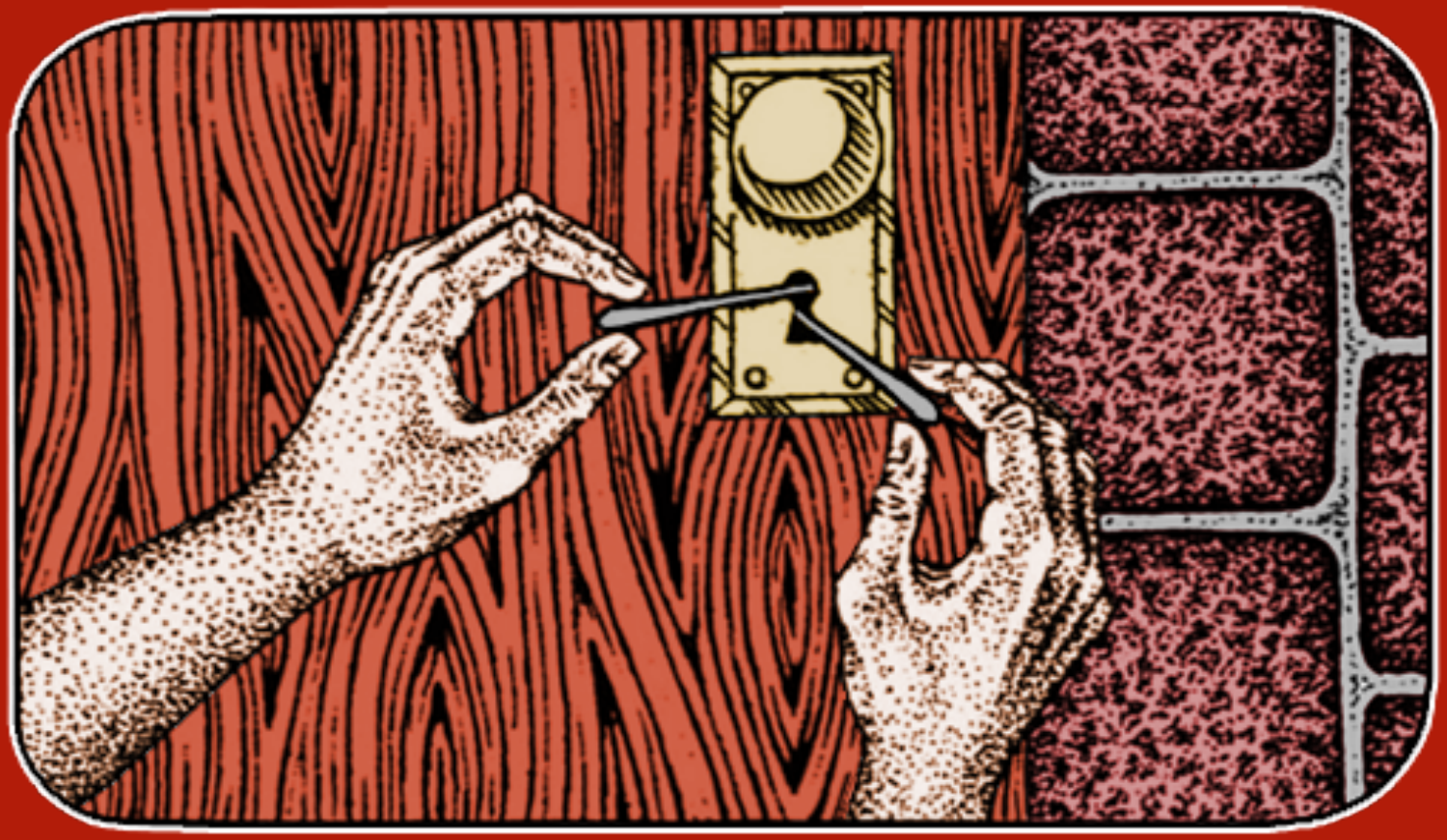
a substantial improvement…

…can be picked, but only with much skill and time

Questions?

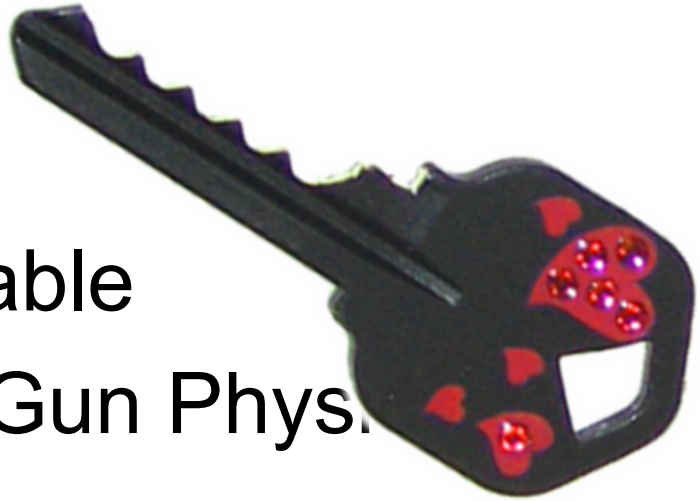


Bumping Attacks

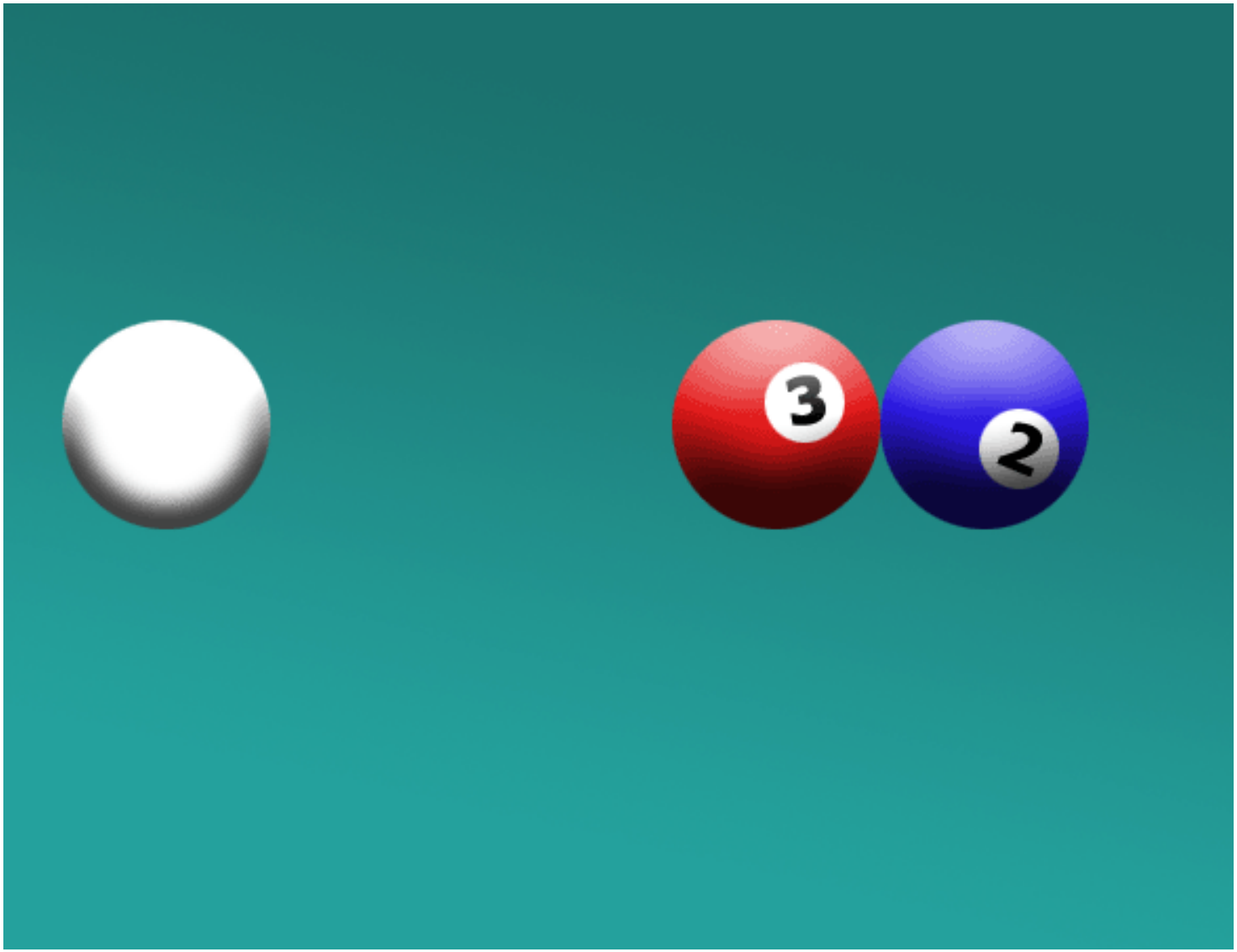


Lock Bumping

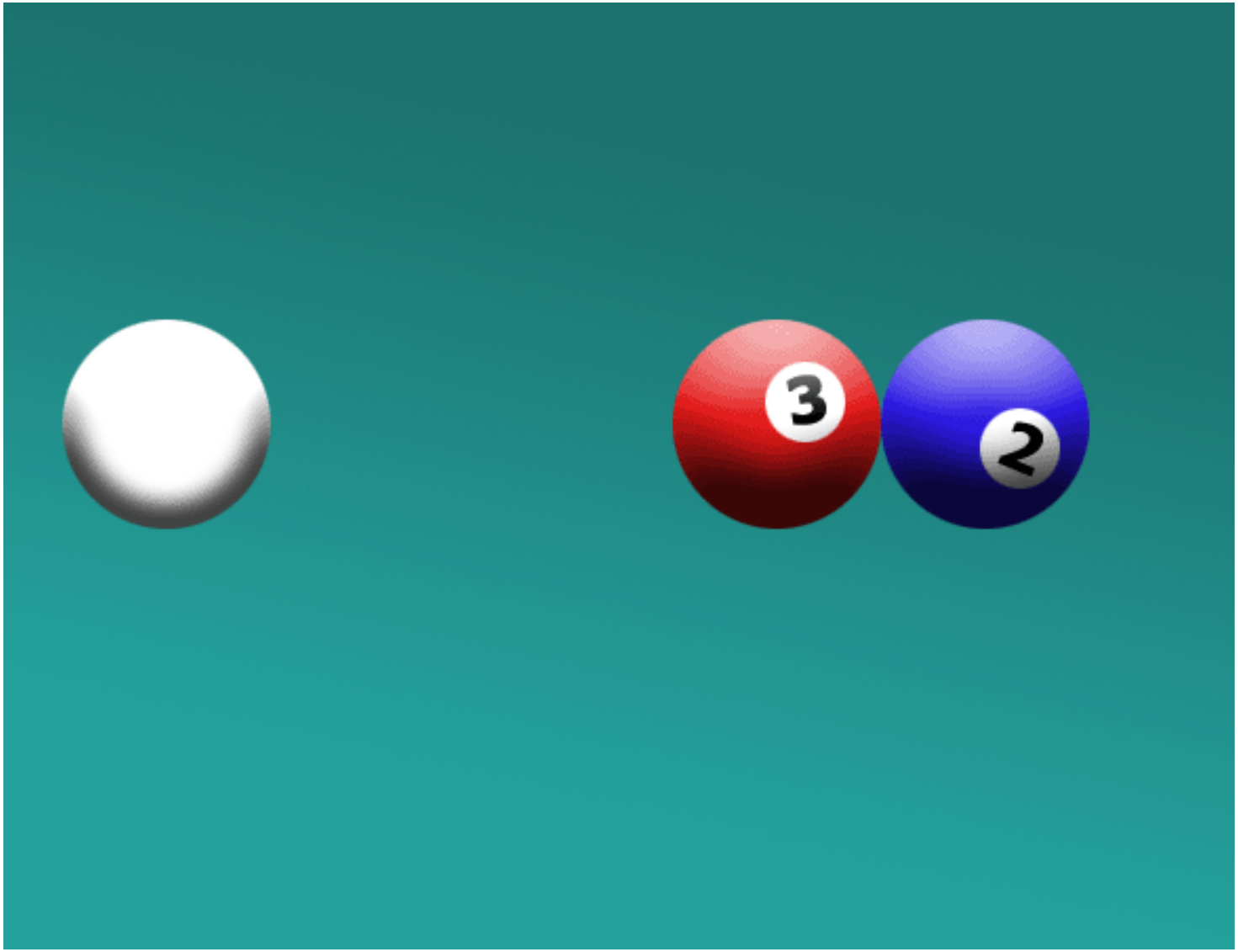
- Just a Special Key
- Little Special Skill
- Many Locks are Vulnerable
- Exploit Related to Pick Gun Phys



Lock Bumping

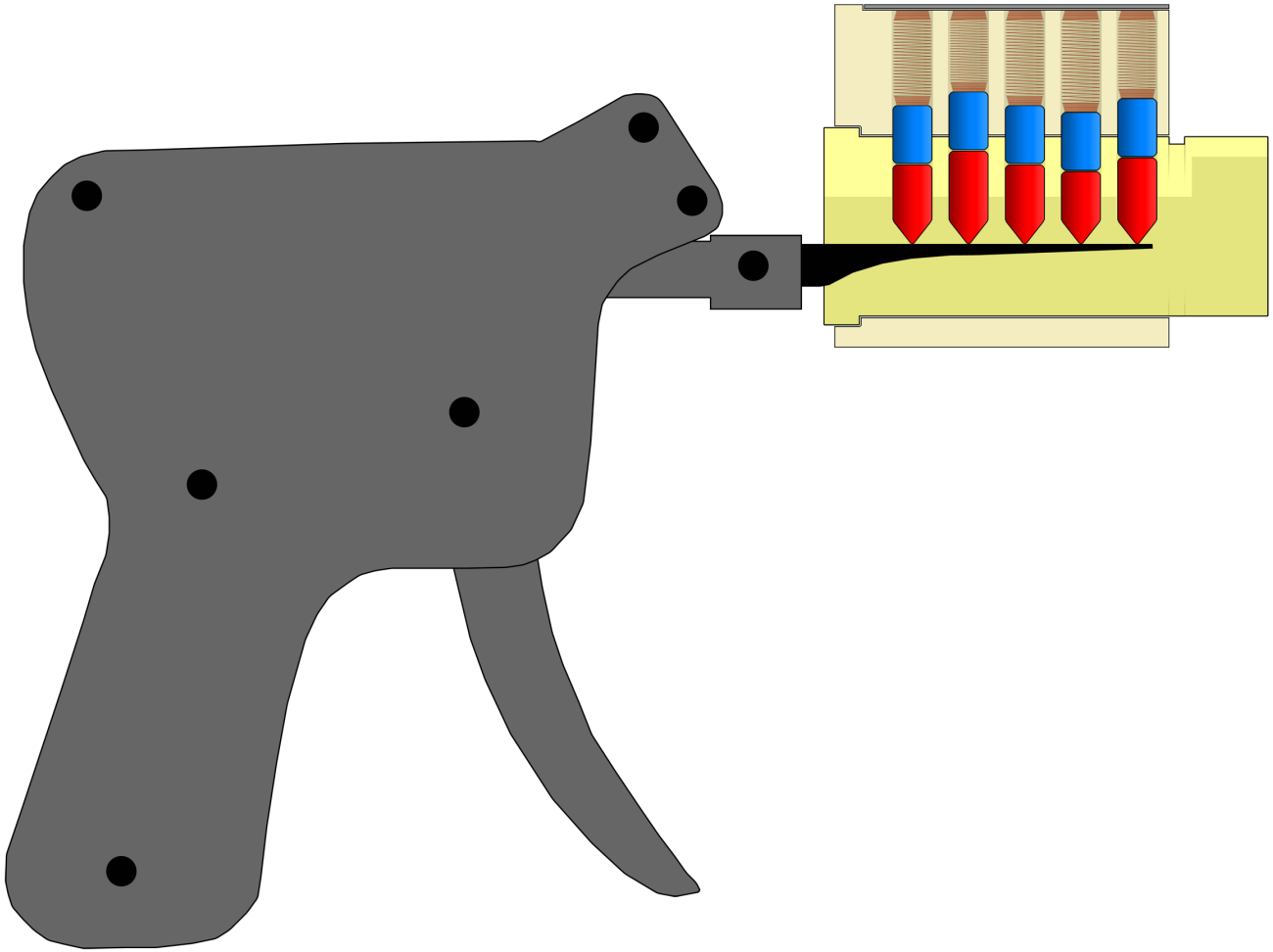


Lock Bumping

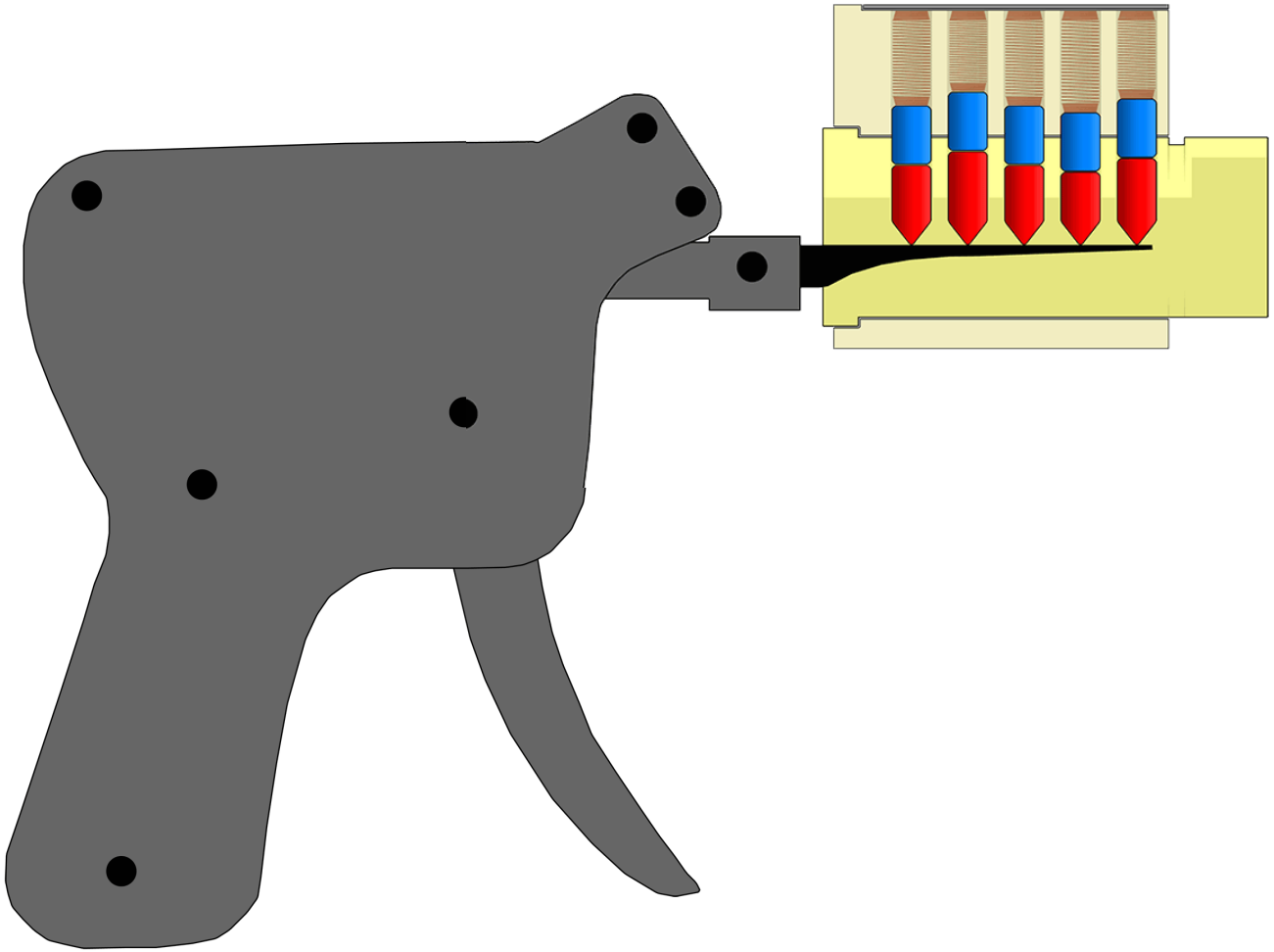


Snapping Guns

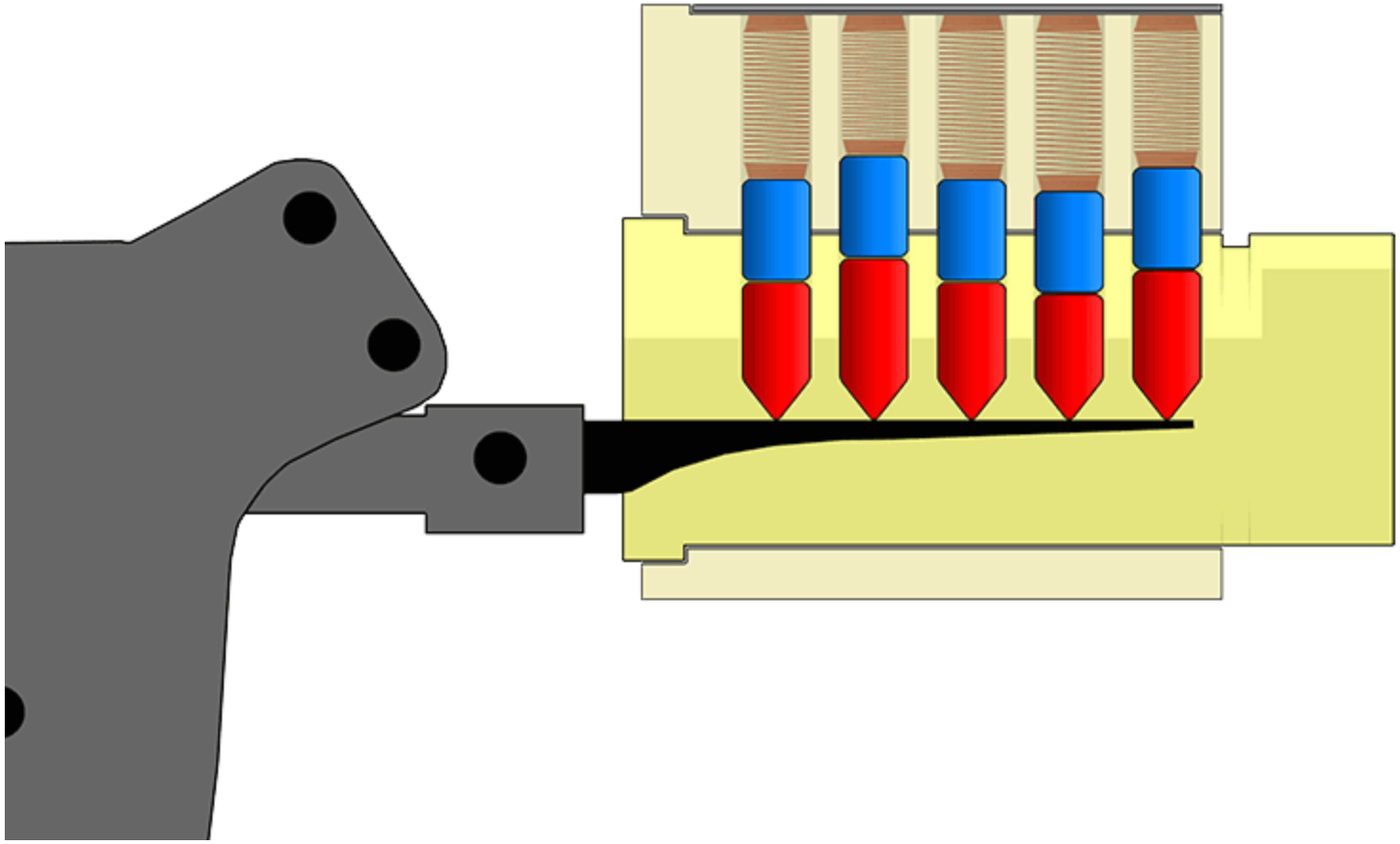
Snapping Guns



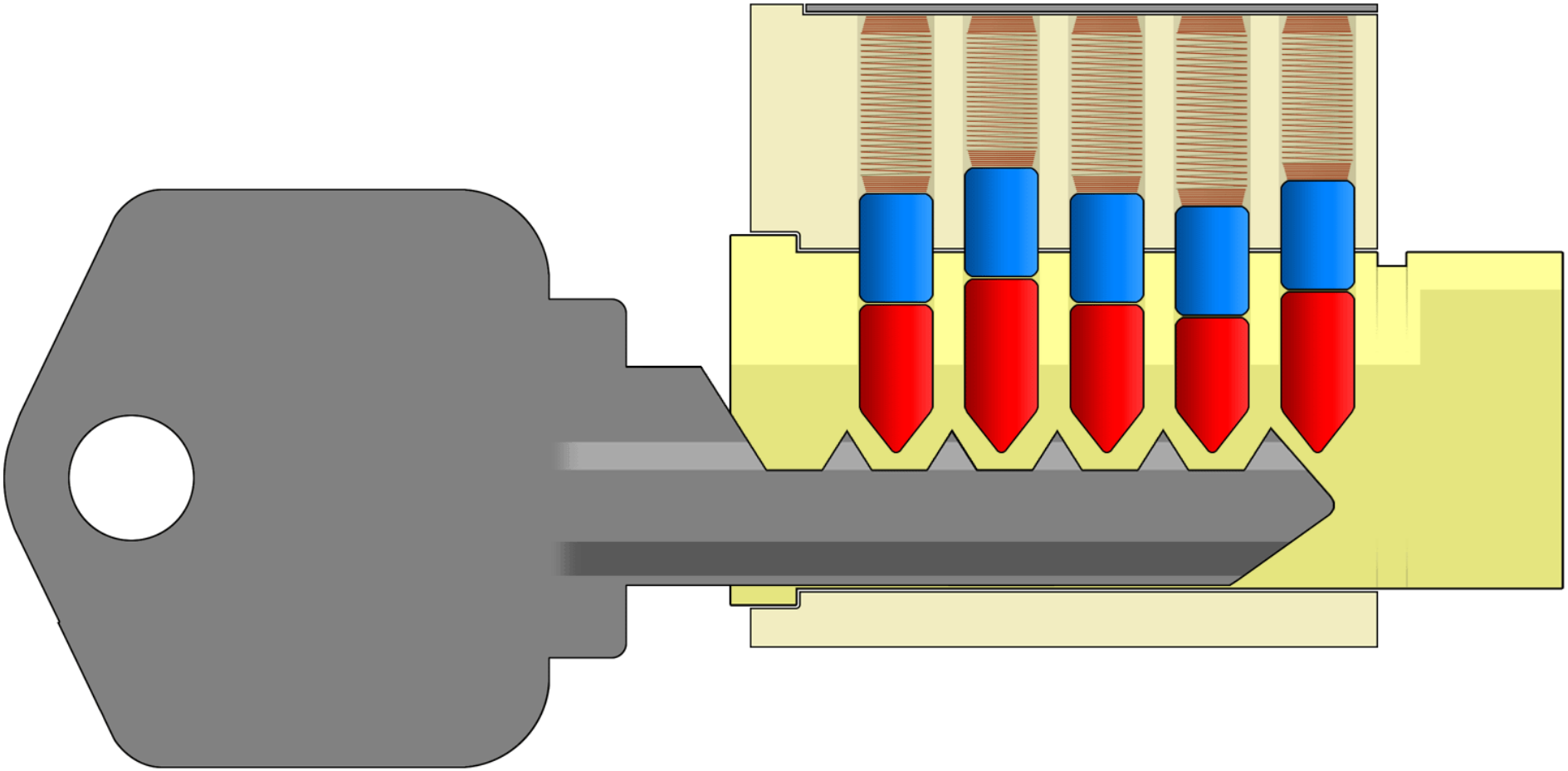
Snapping Guns



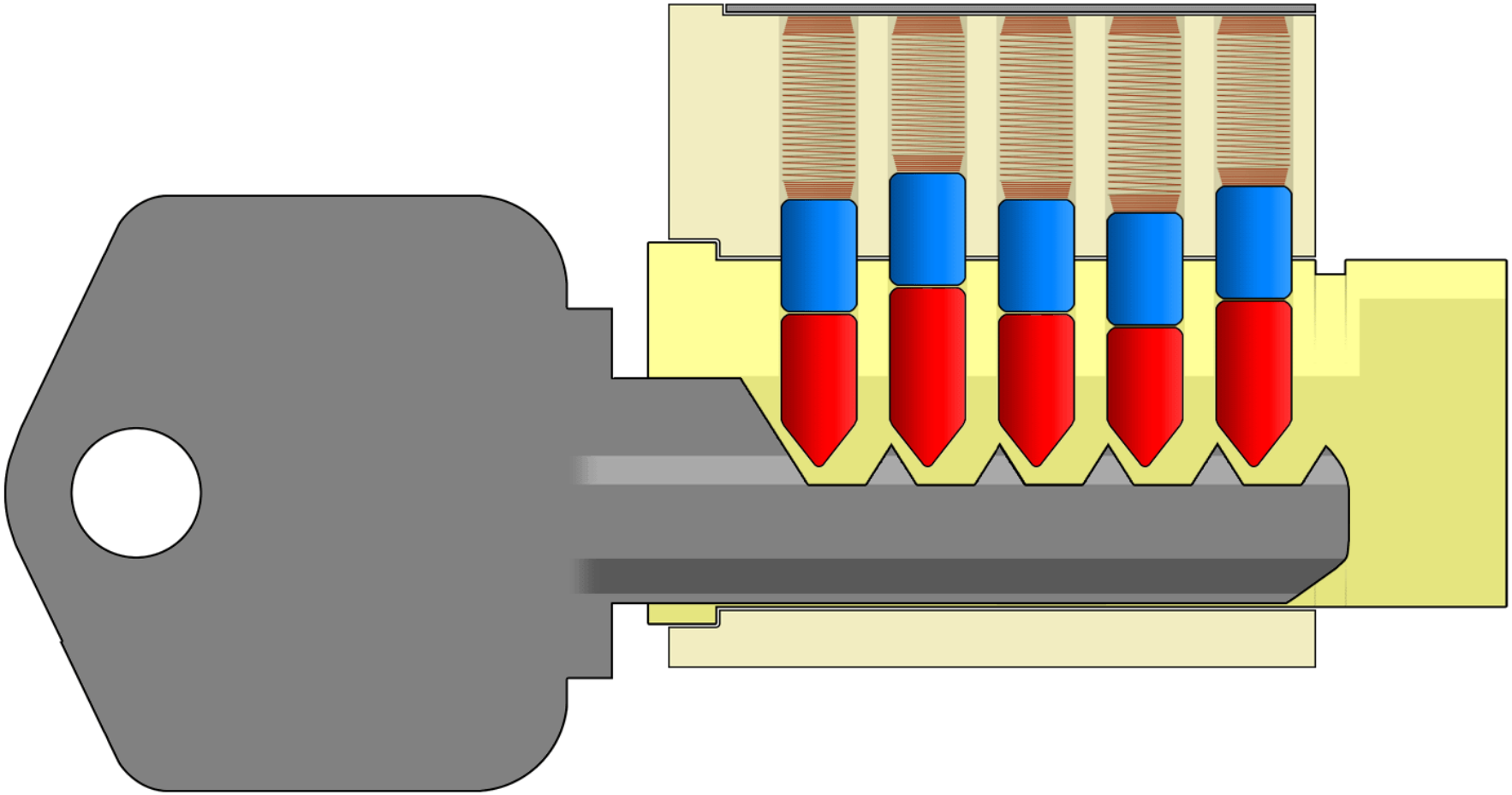
Snapping Guns



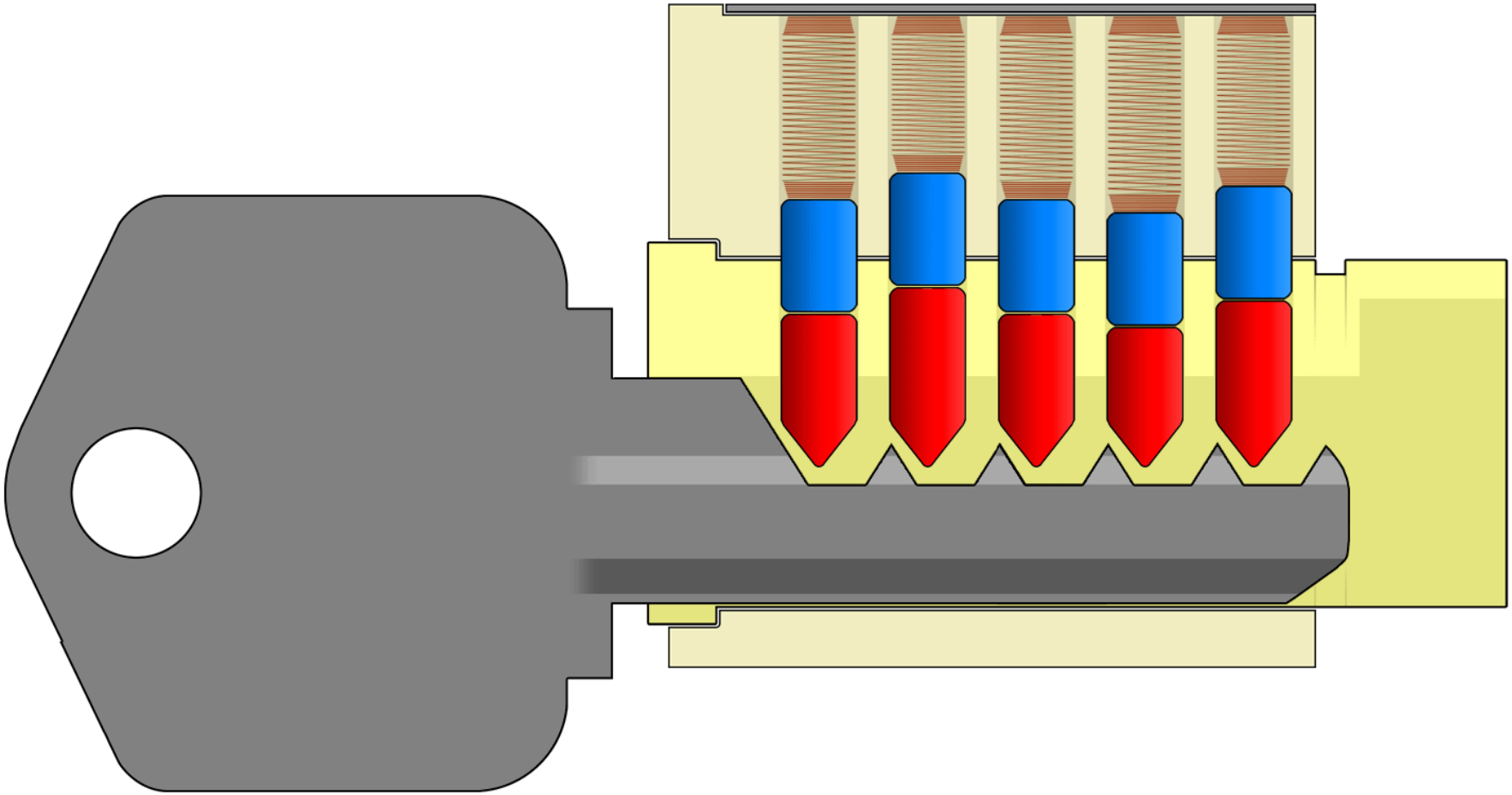
Lock Bumping – Pull Method



Lock Bumping – Push Method



Lock Bumping – Push Method



Lock Bumping

http://toool.nl/bumping.pdf

Lock Bumping

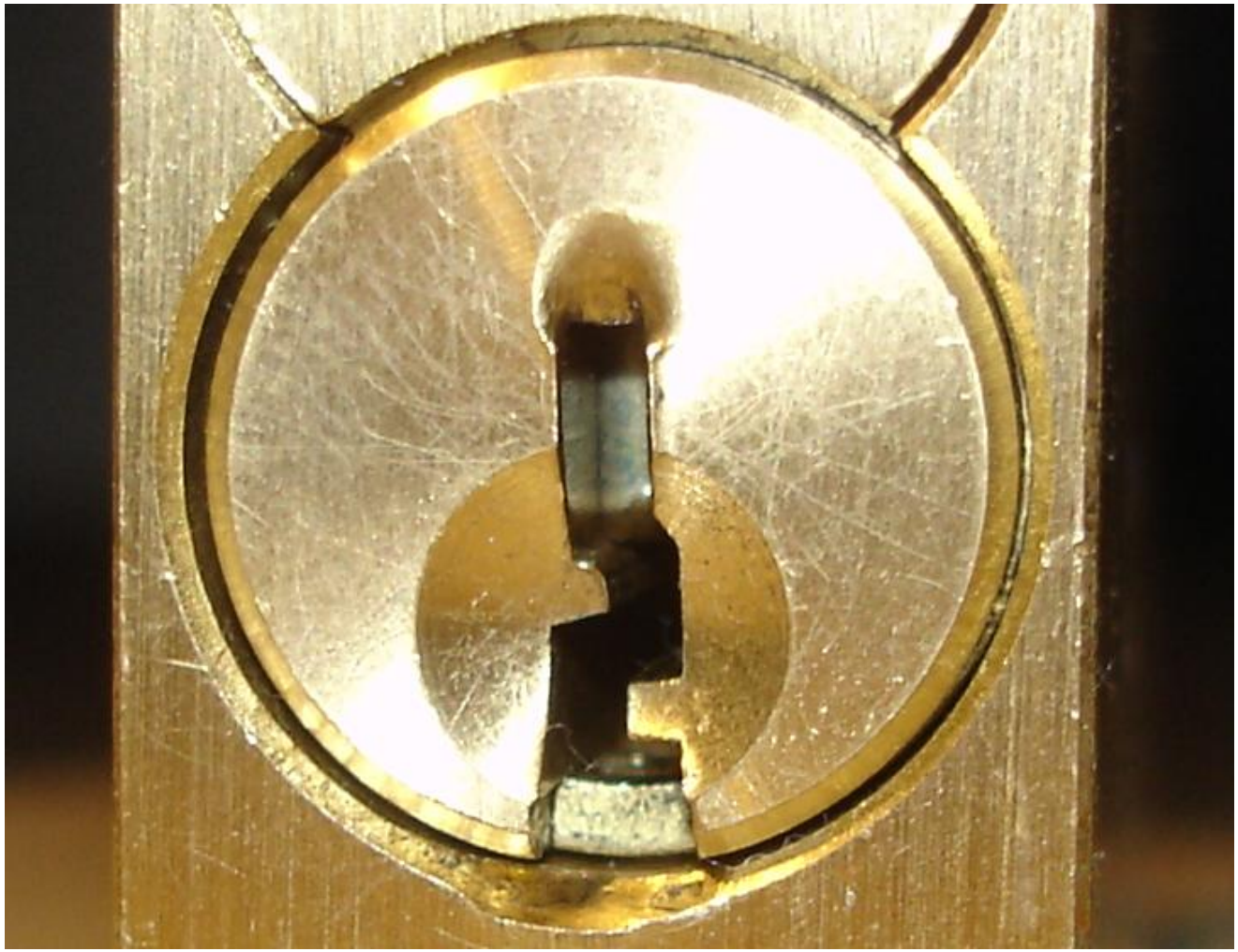
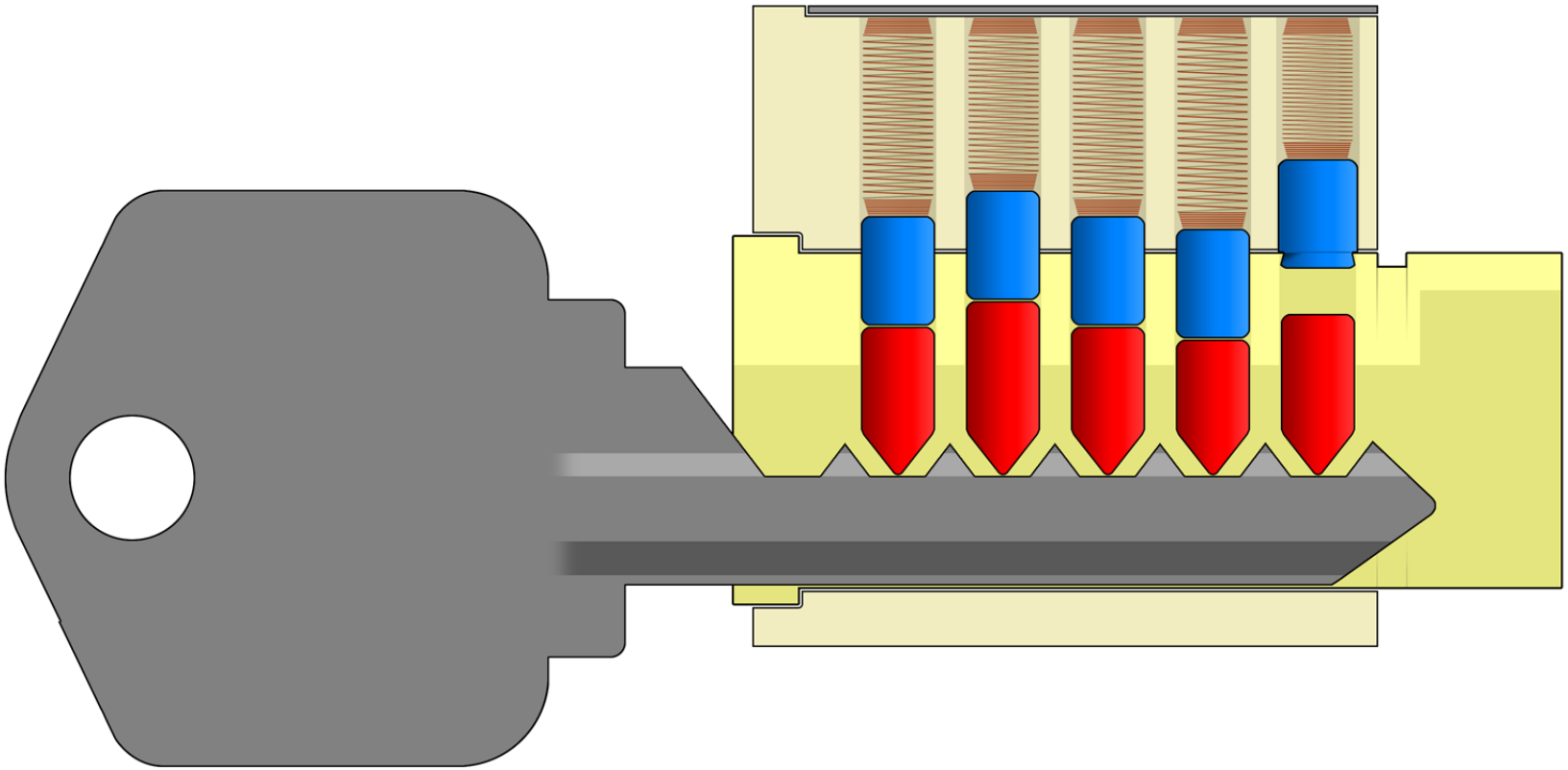
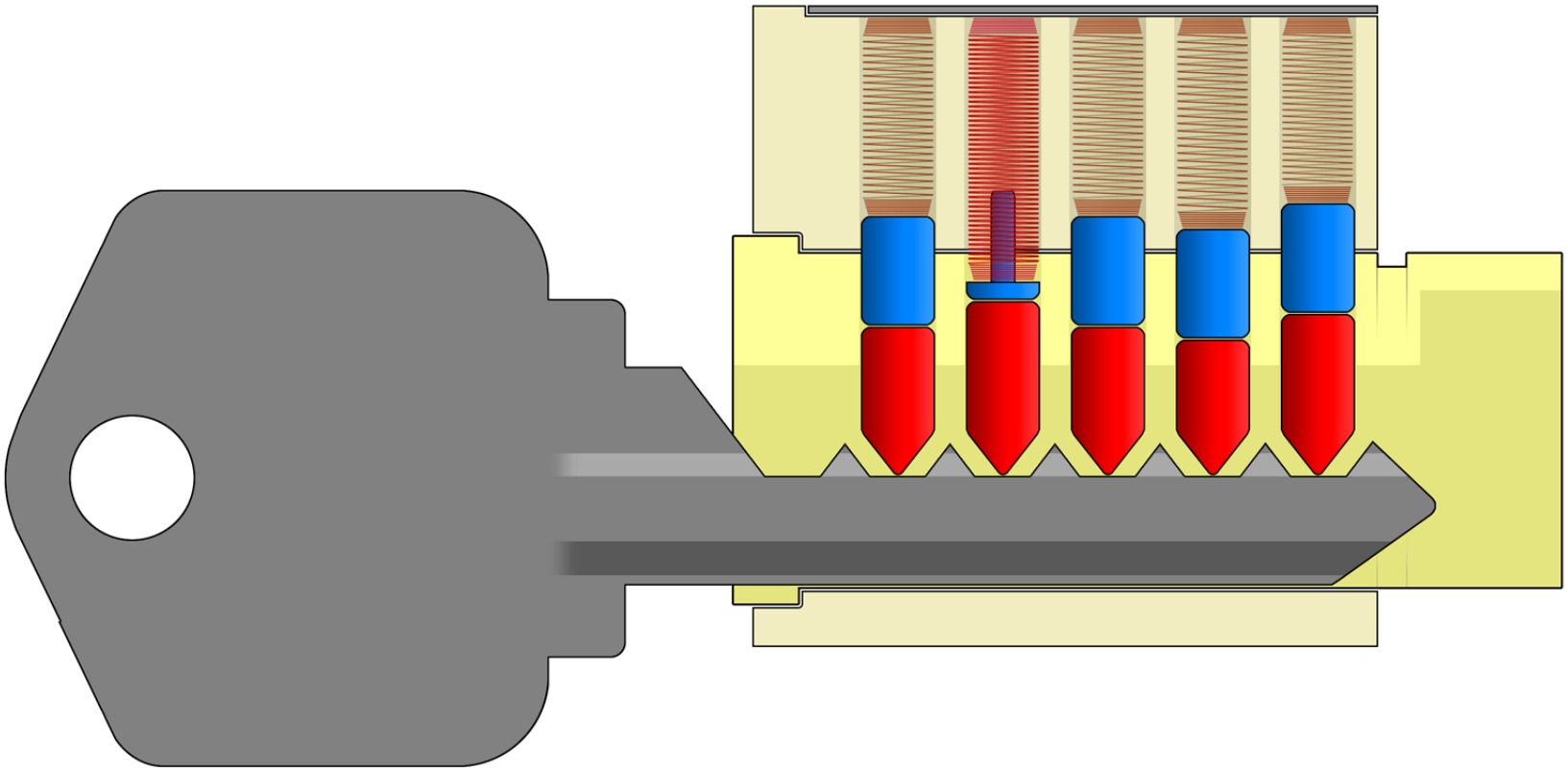


photo courtesy of datagram

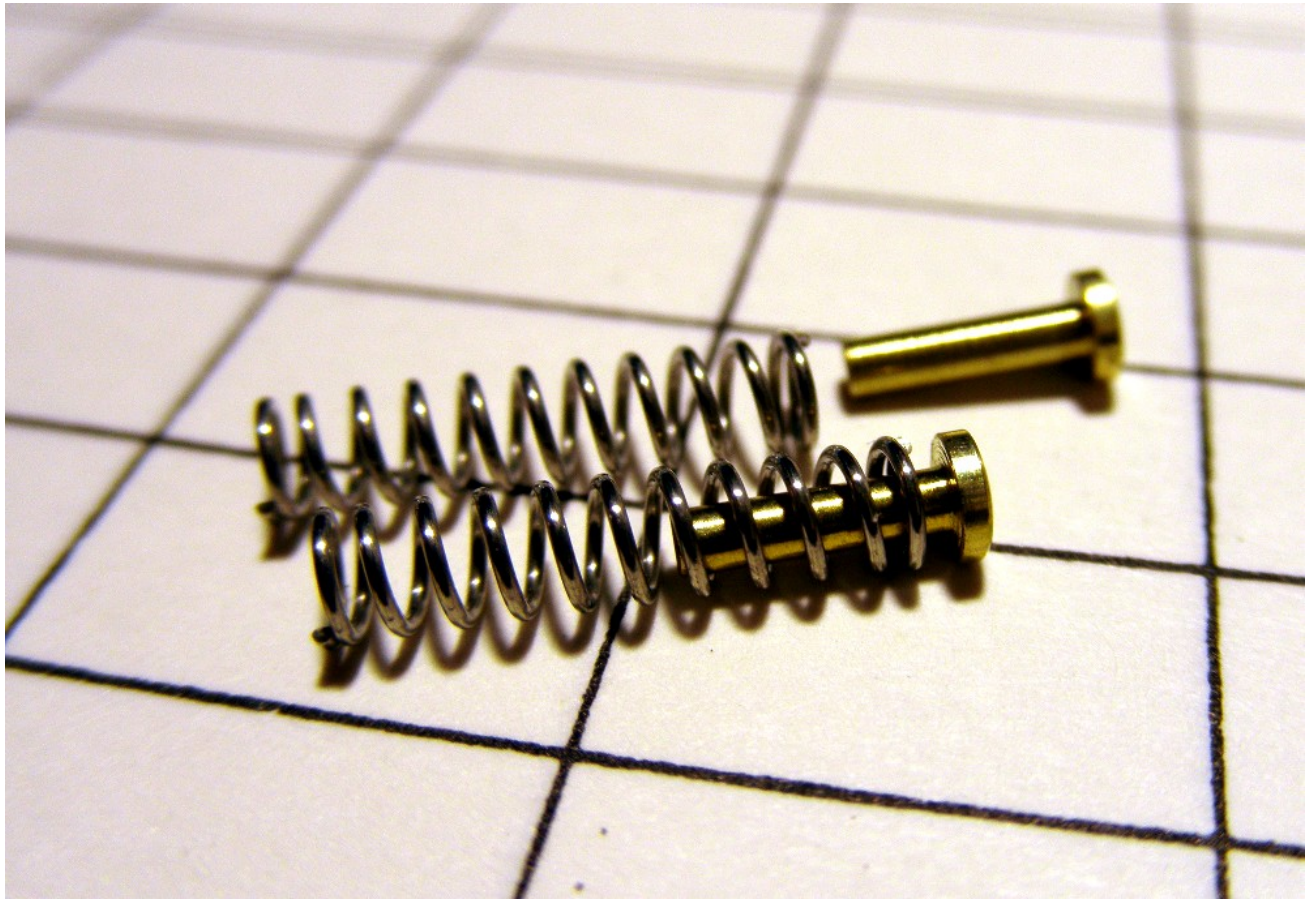
Bumping Countermeasures – Top Gapping



Bumping Countermeasures – Anti-Bump Driver Pin



Bumping Countermeasures – Anti-Bump Driver Pin



Bumping Countermeasures – Anti-Bump Driver Pi

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Bump Halt™ (Bump Resistant Cylinders)

Bump Halt provides a "bump resistant" solution for the Ilco line of Key in knob / Key in Deadbolt, Mortise and Rim Cylinders. This Innovative Patent Pending solution to bumping will resist the transfer of force from the bump key to the pins.

Kits are also available that will enable conversion of a new or existing Ilco Cylinder.

- Effective yet cost efficient
- No special tools or machining required
- Available factory installed or as aconversion kit
- Conversion kits contain 10 pins, 10 springs and instructions (one pin and one spring will resist bumping; add anadditional pin and spring to increase the security.

Bump Halt™ has not been tested on competitive brands of cylinders.

Documentation

Cylinders brochures, pricing information, manuals, parts lists, etc. can be found on the literature grid section.

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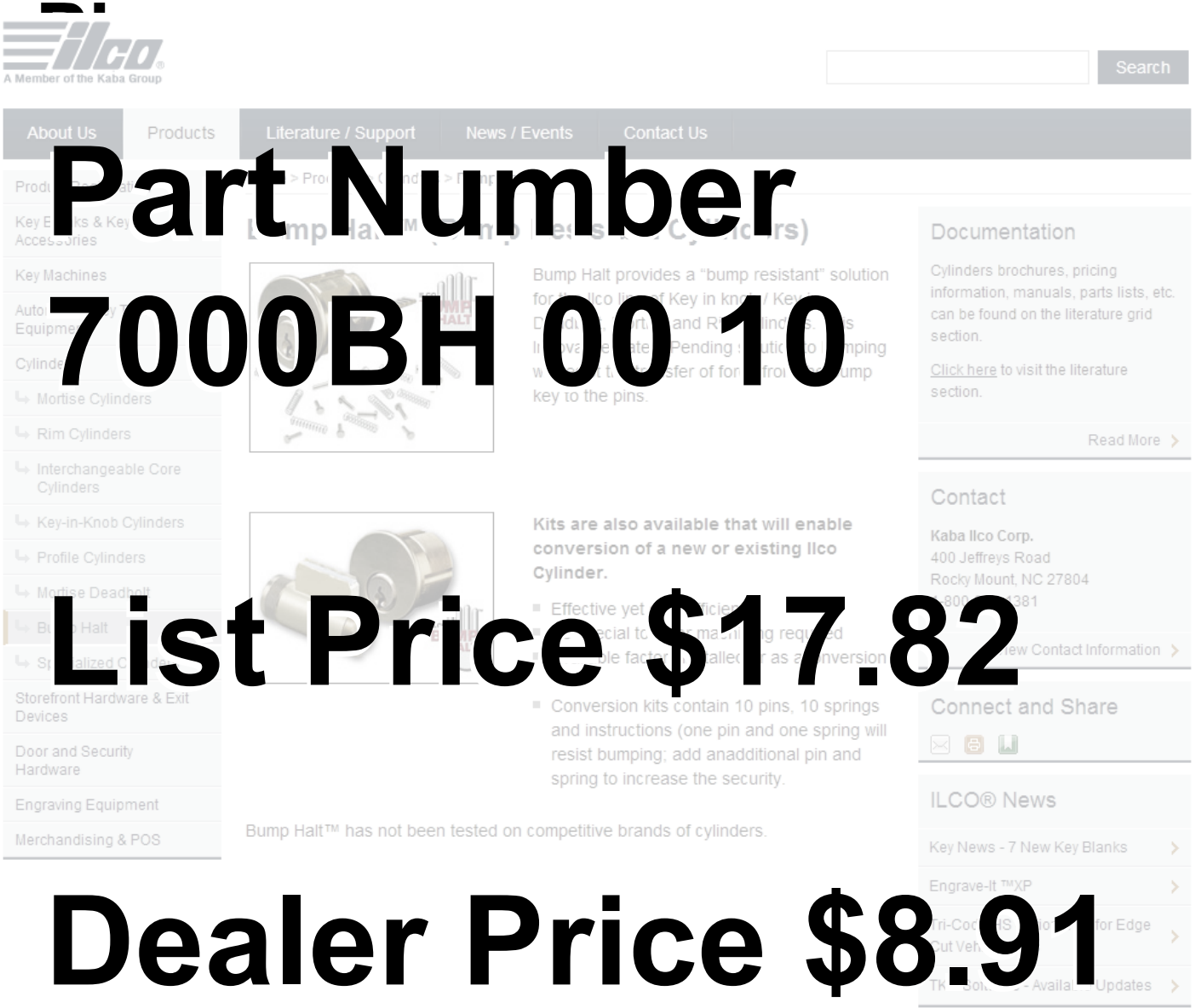
Bumping Countermeasures – Anti-Bump Driver Pi



Part Number

7000BH 00 10

List Price $17.82

Dealer Price $8.91

Bumping Countermeasures – Anti-Bump Driver Pin

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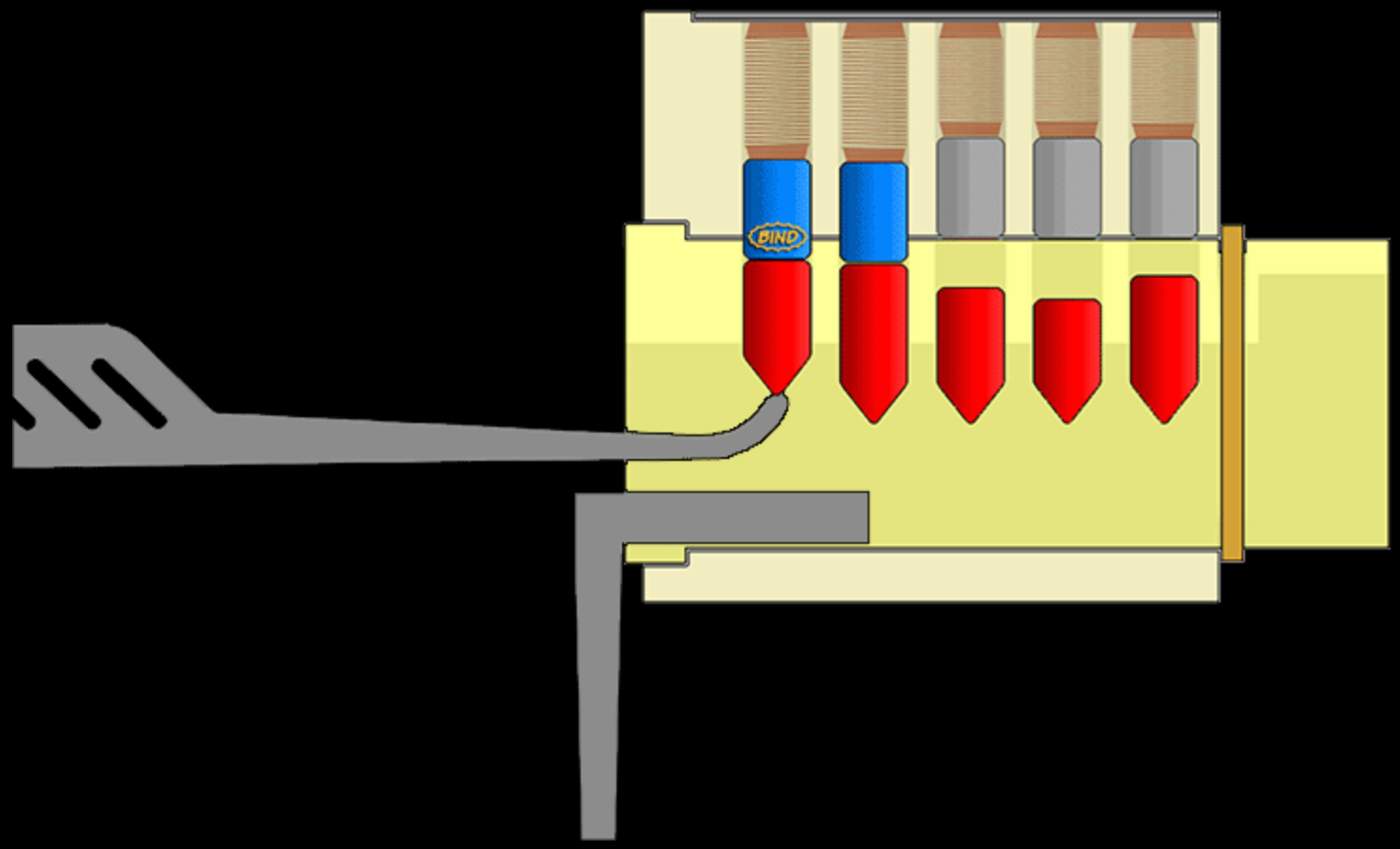
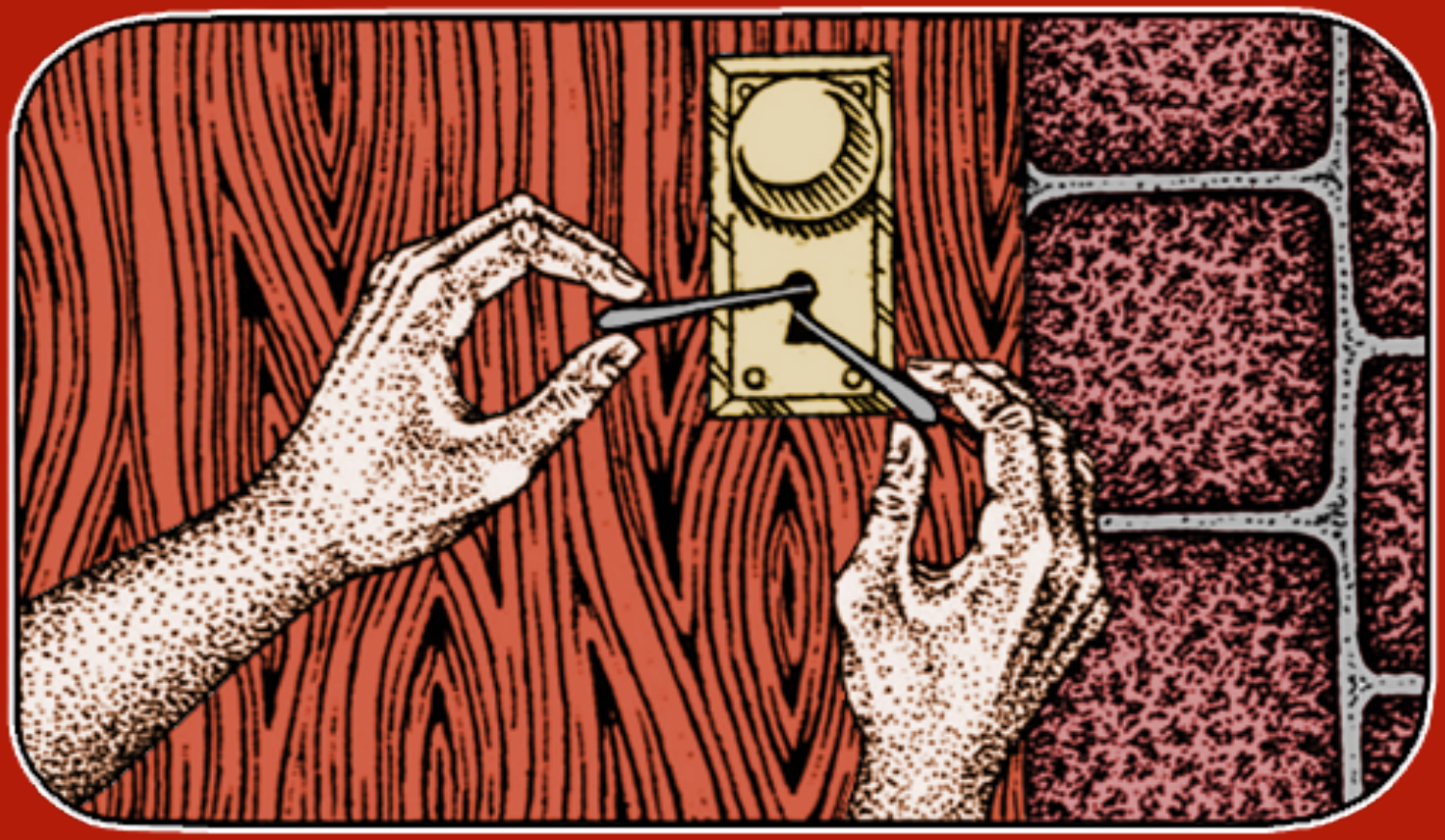


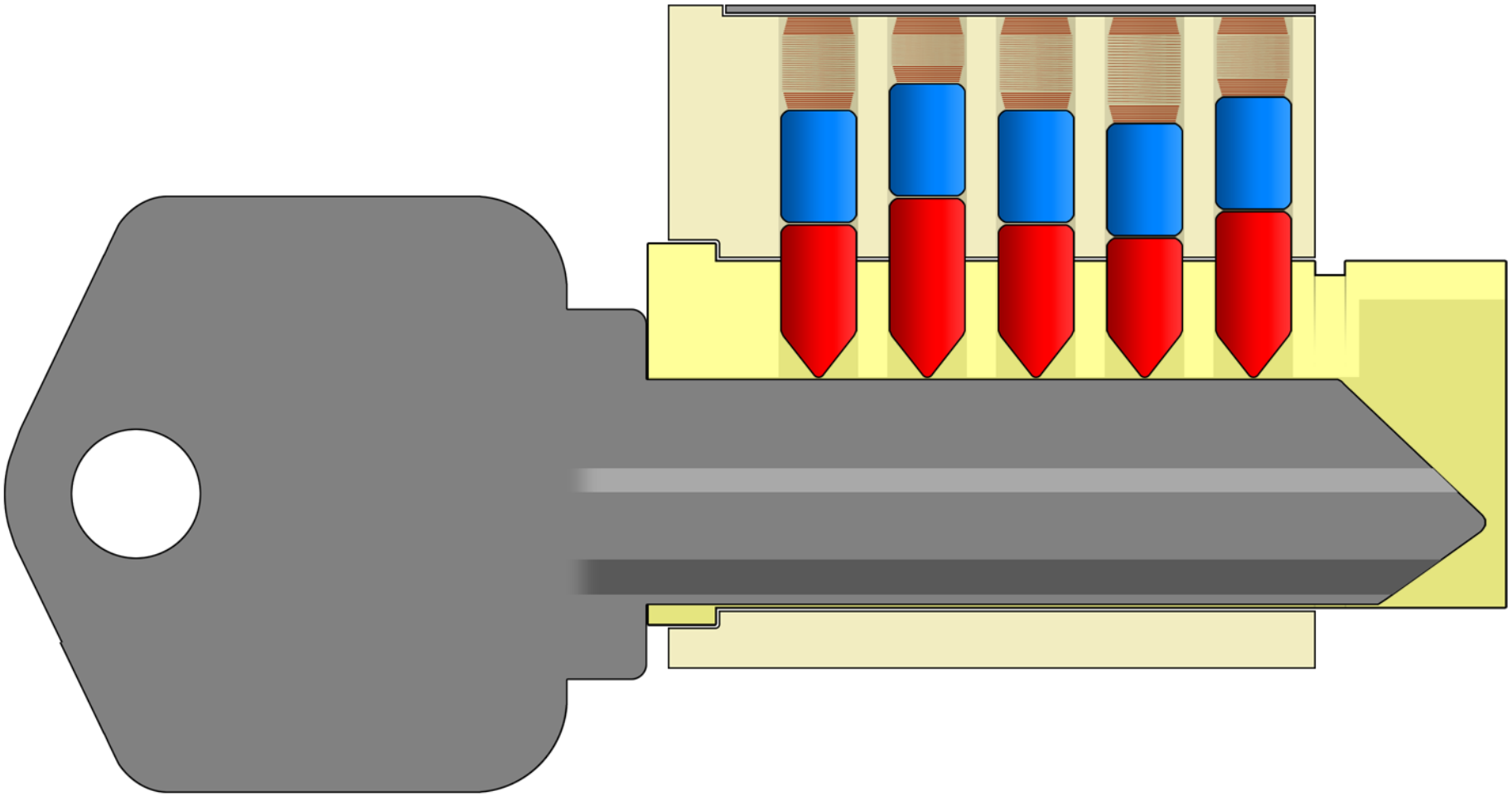
Impressioning



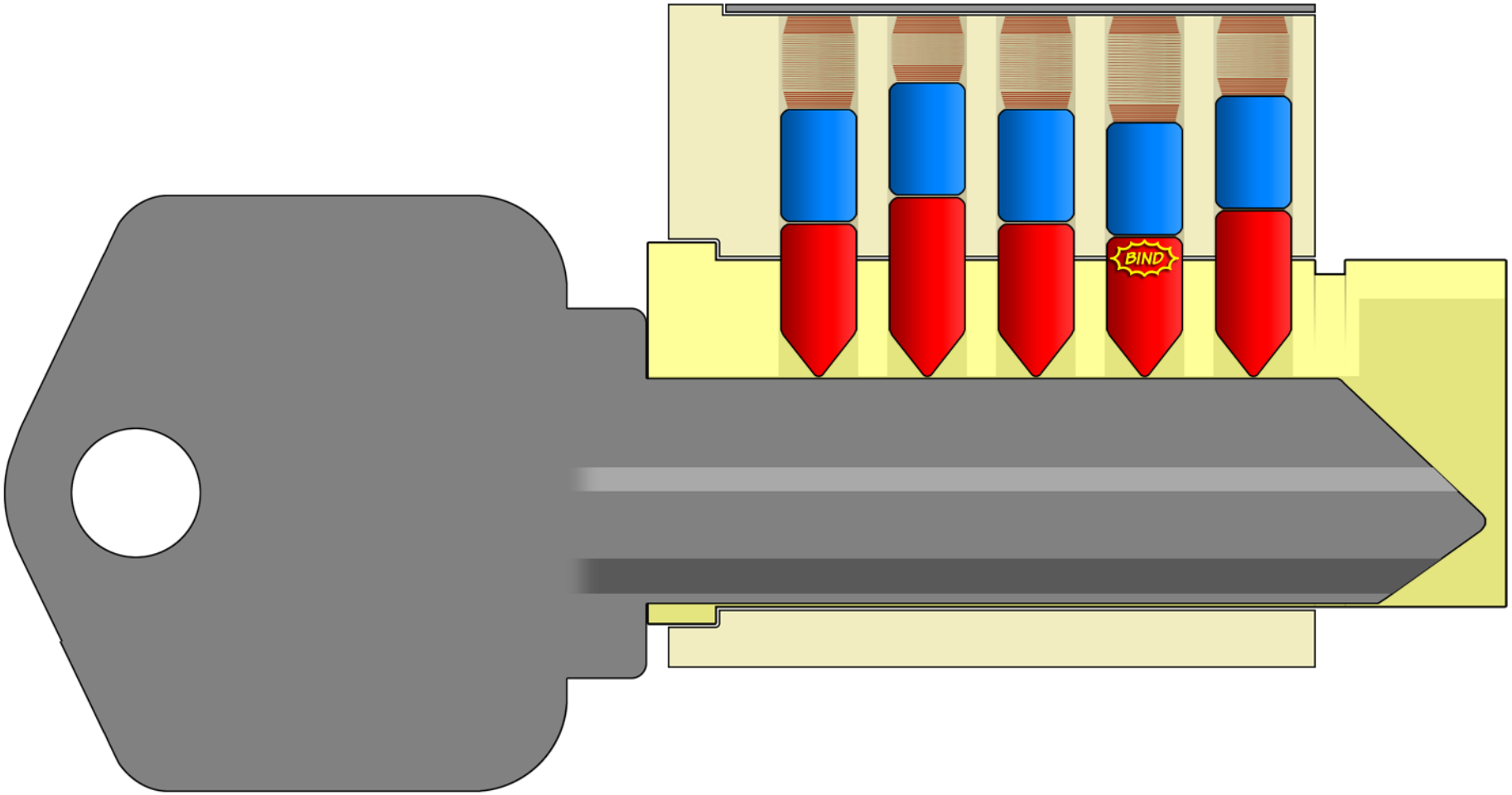
Why Impressioning?

Why Impressioning?

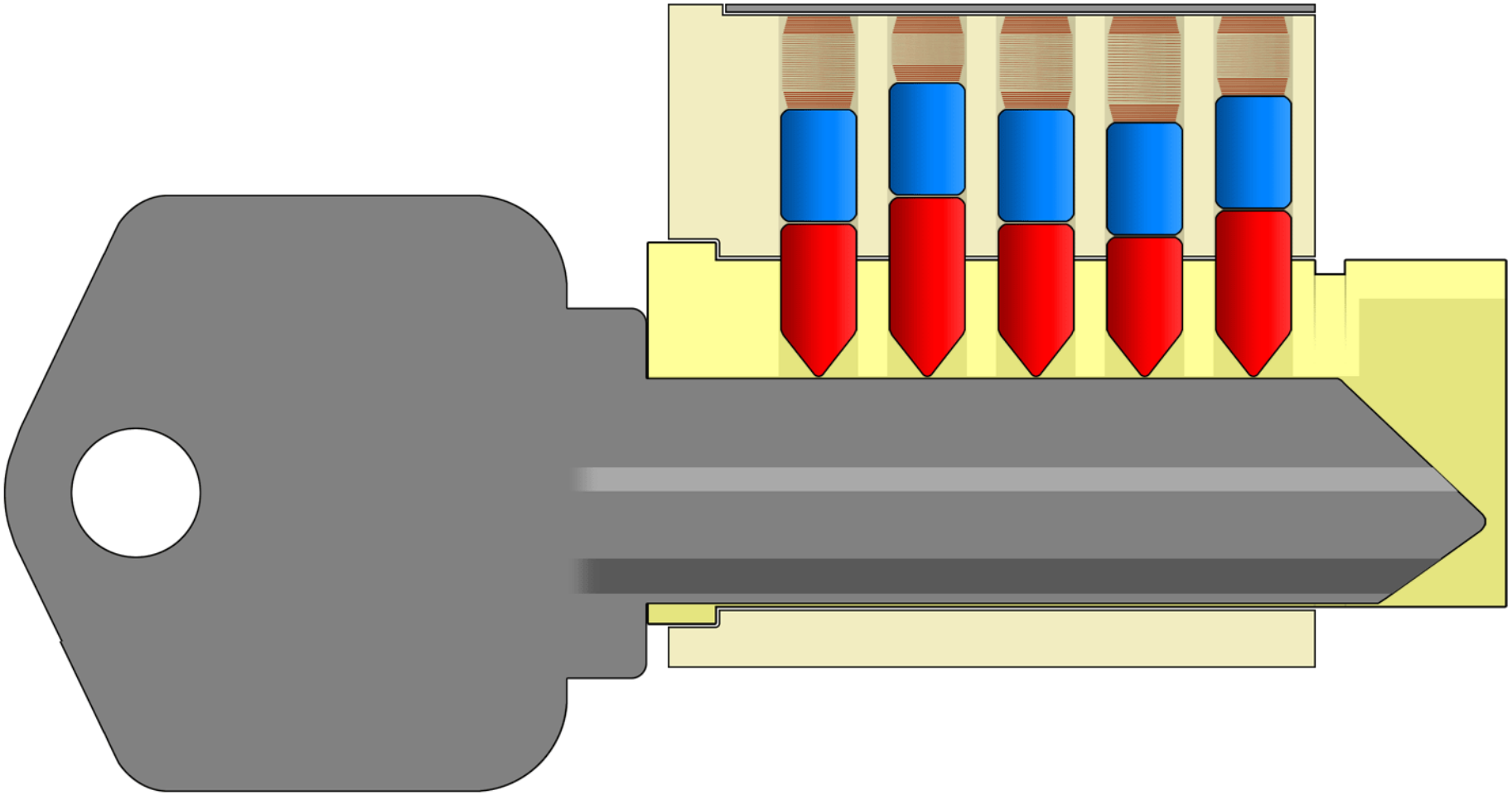
Impressioning – Blank Key to Raise all Stacks



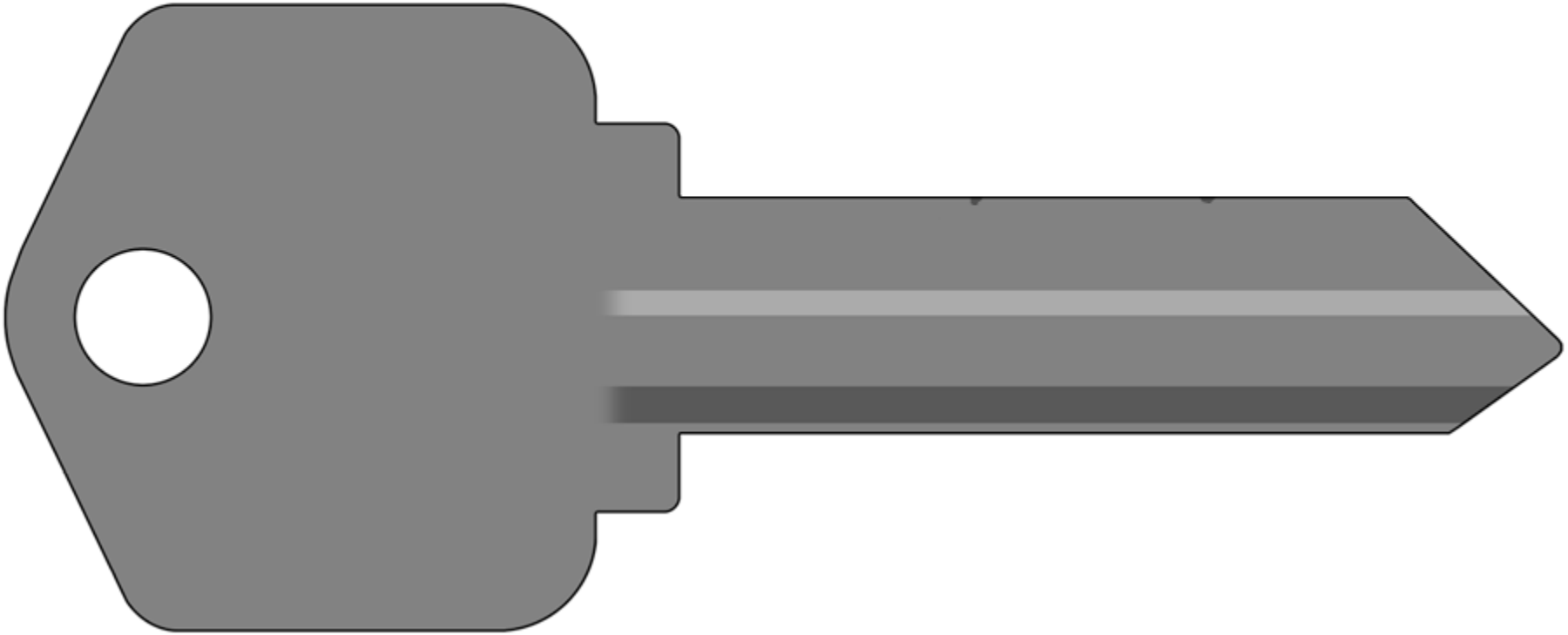
Impressioning – Turn Hard to Bind a Key Pin



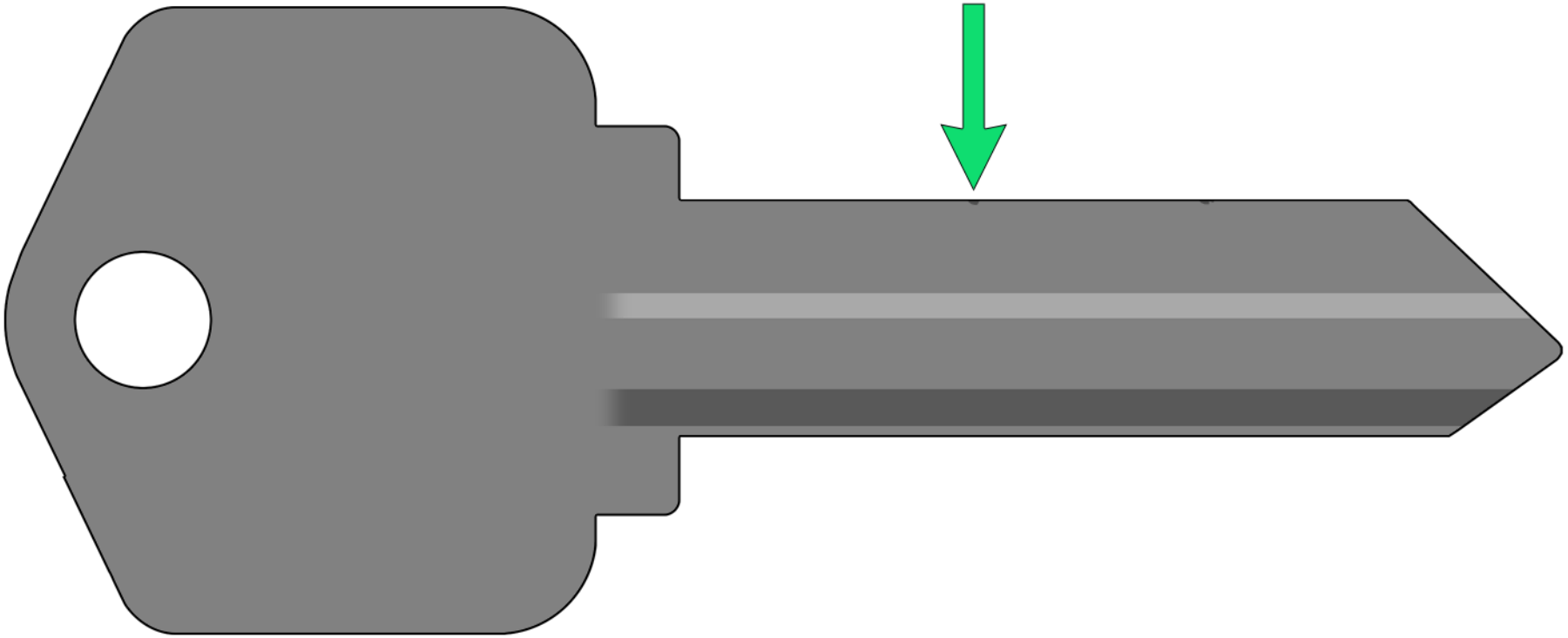
Impressioning – Binding and Wiggling Causes Rubbing



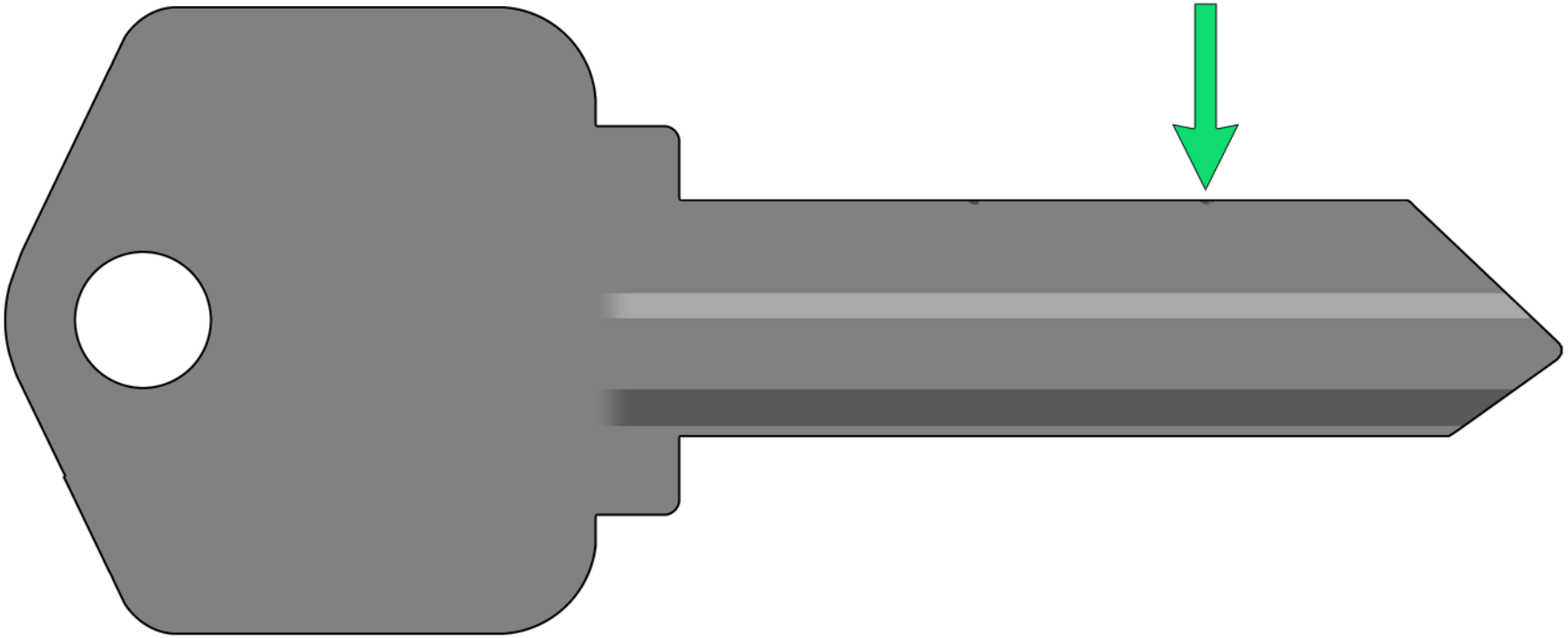
Impressioning – Observe the Rub Marks



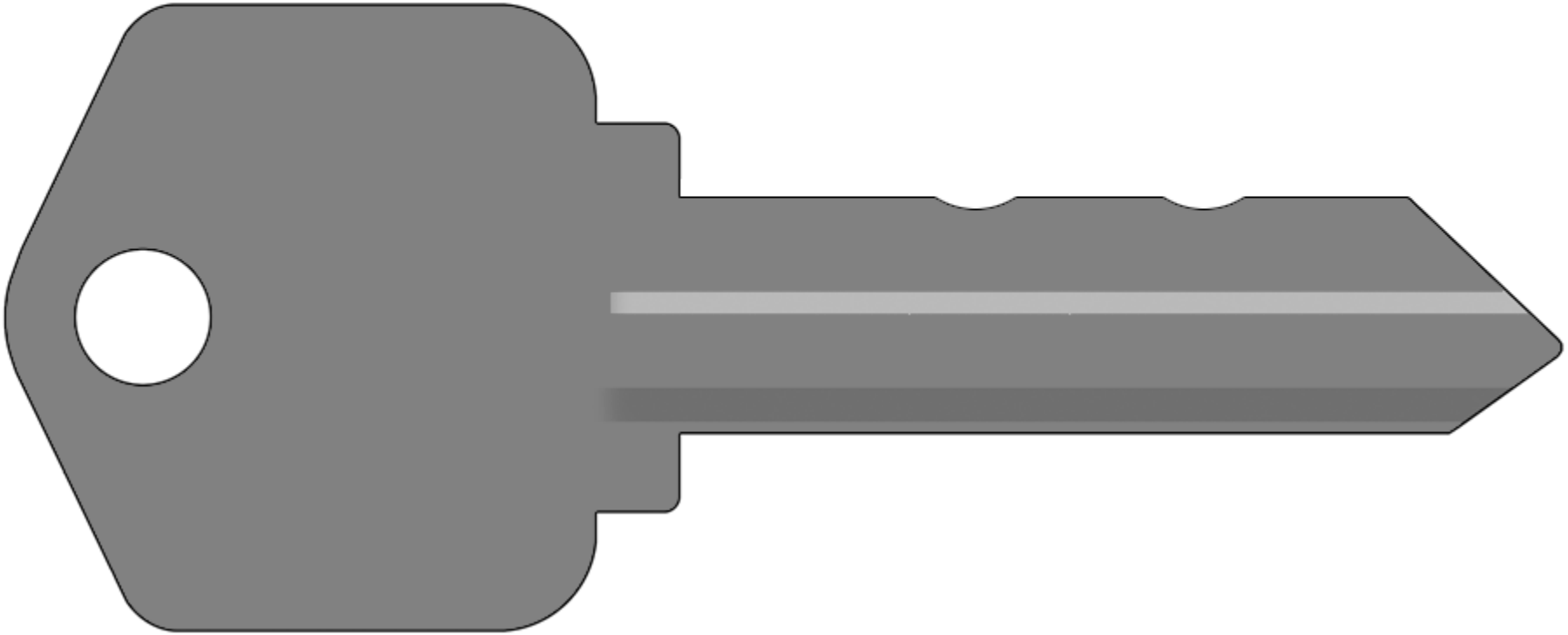
Impressioning – Observe the Rub Marks



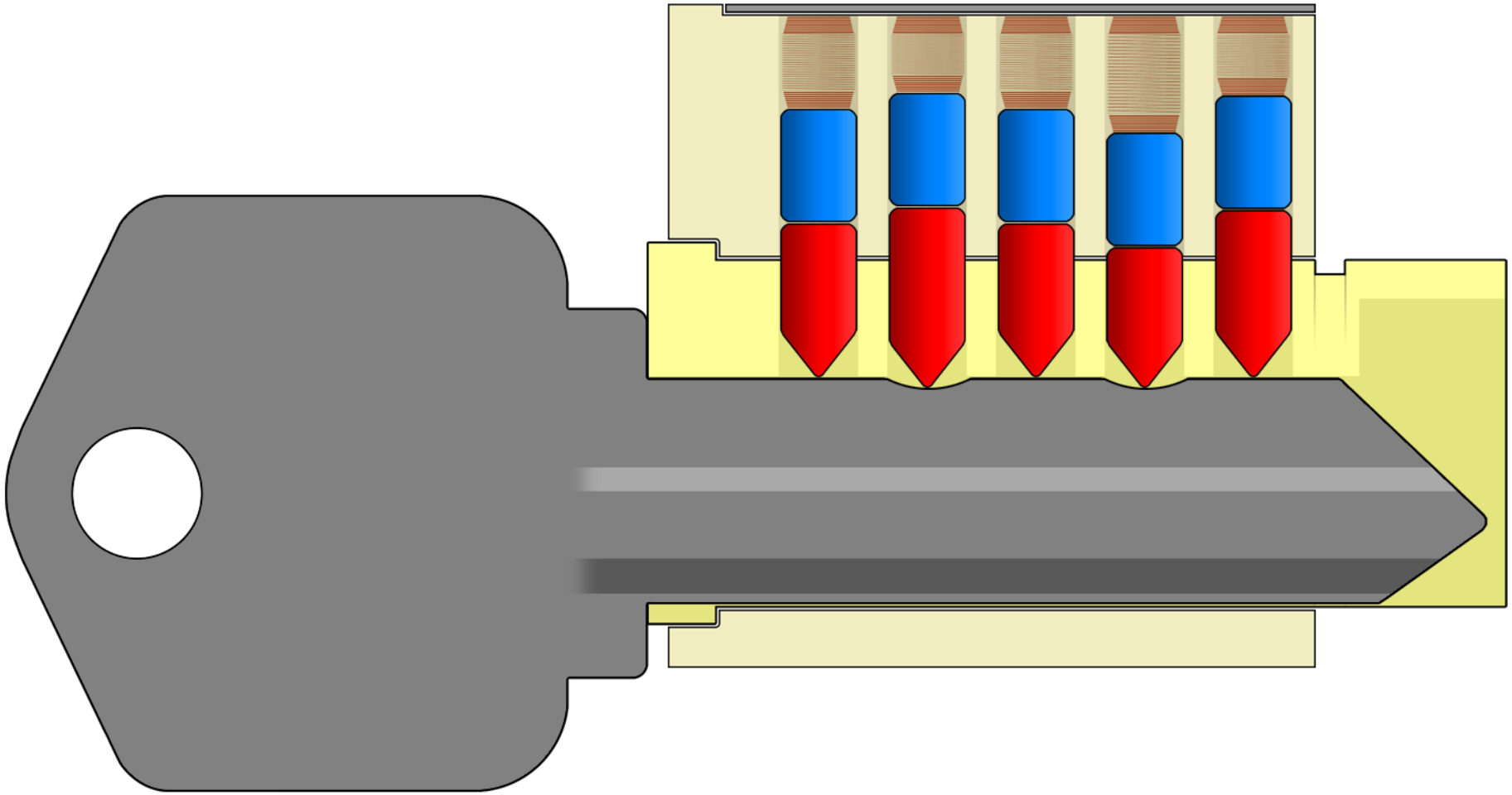
Impressioning – Observe the Rub Marks



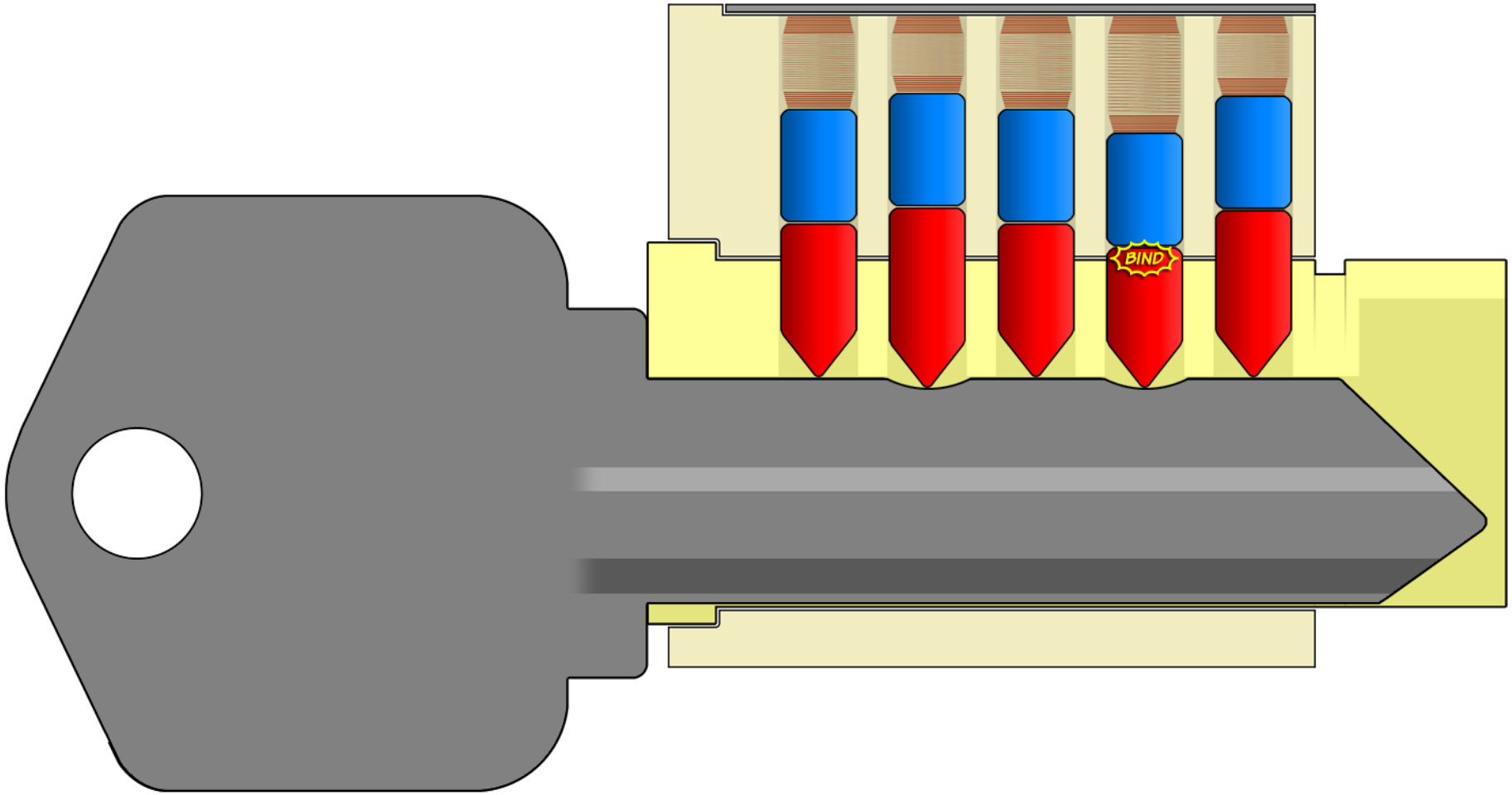
Impressioning – File Down at the Rub Marks



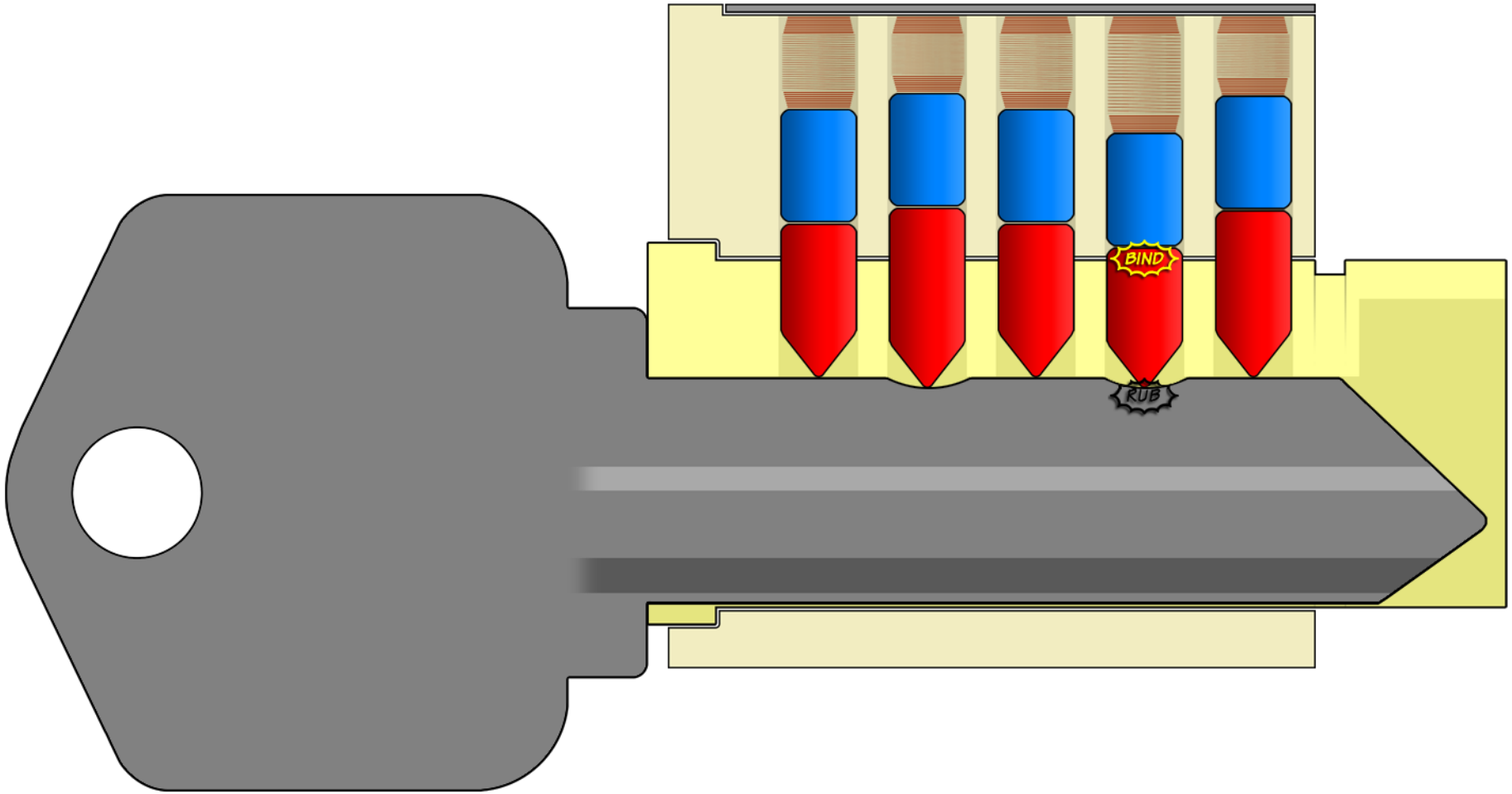
Impressioning – Repeat the Process



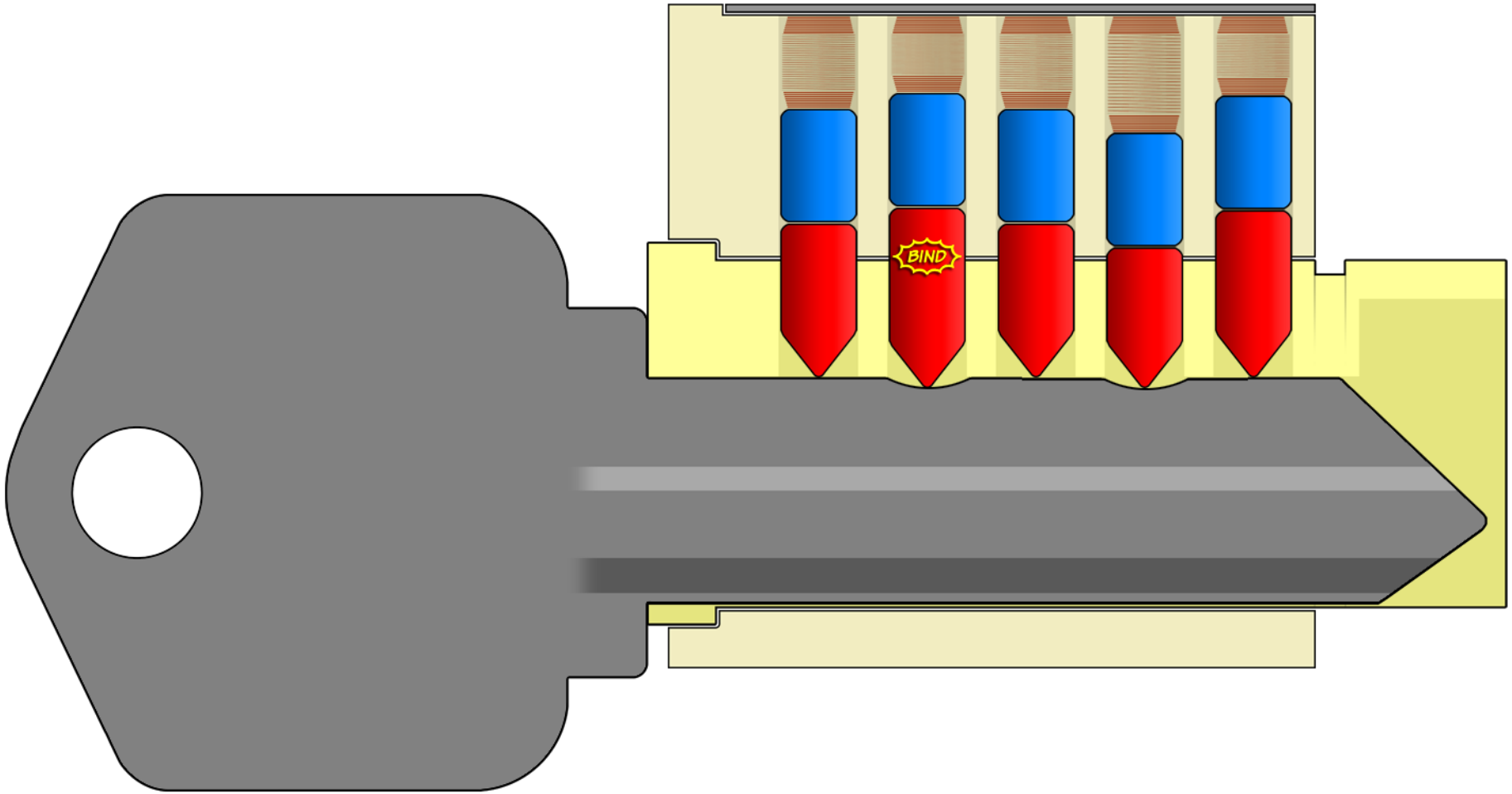
Impressioning – Stack 4 is still Binding



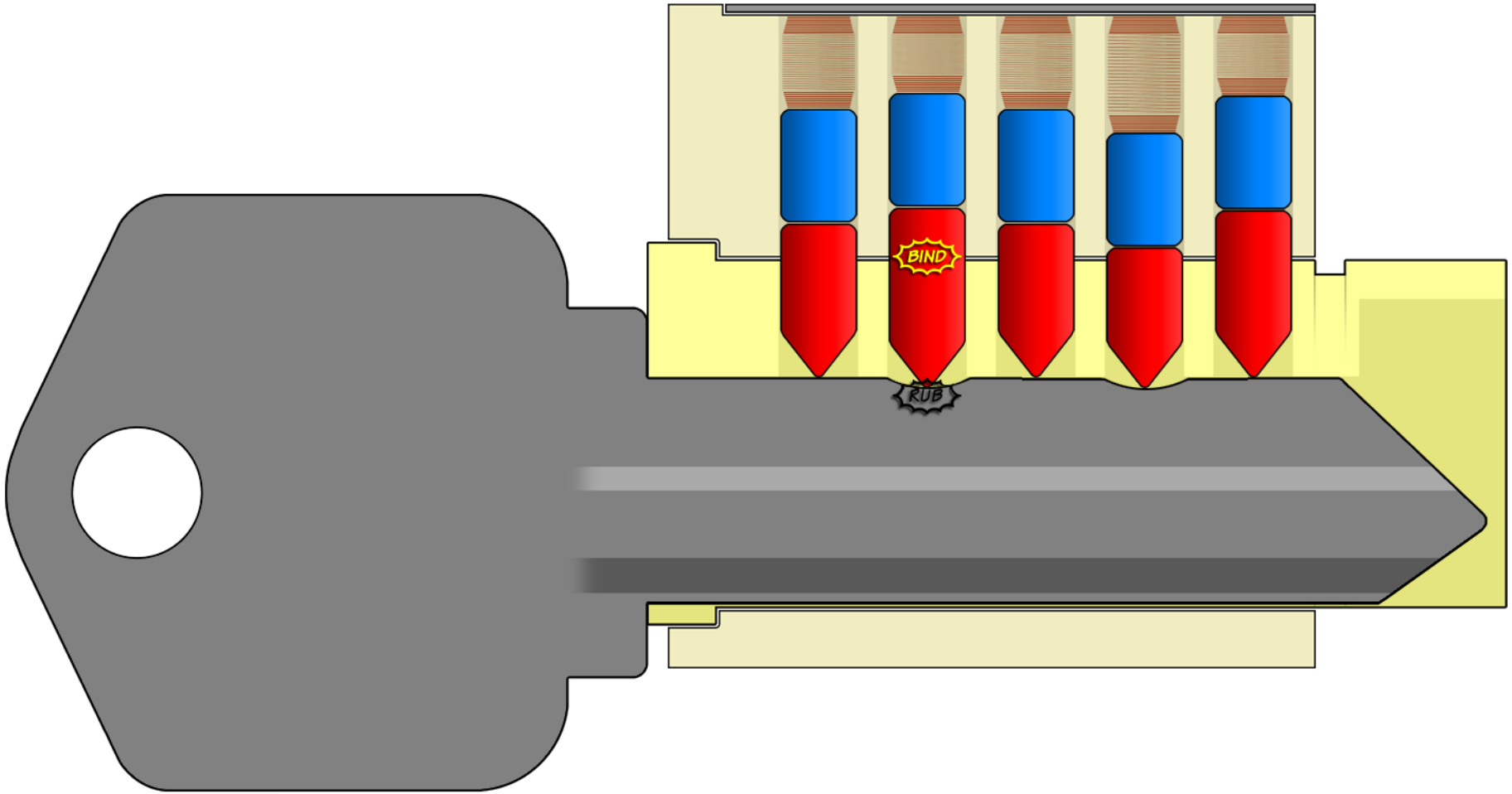
Impressioning – Stack 4 is still Rubbing



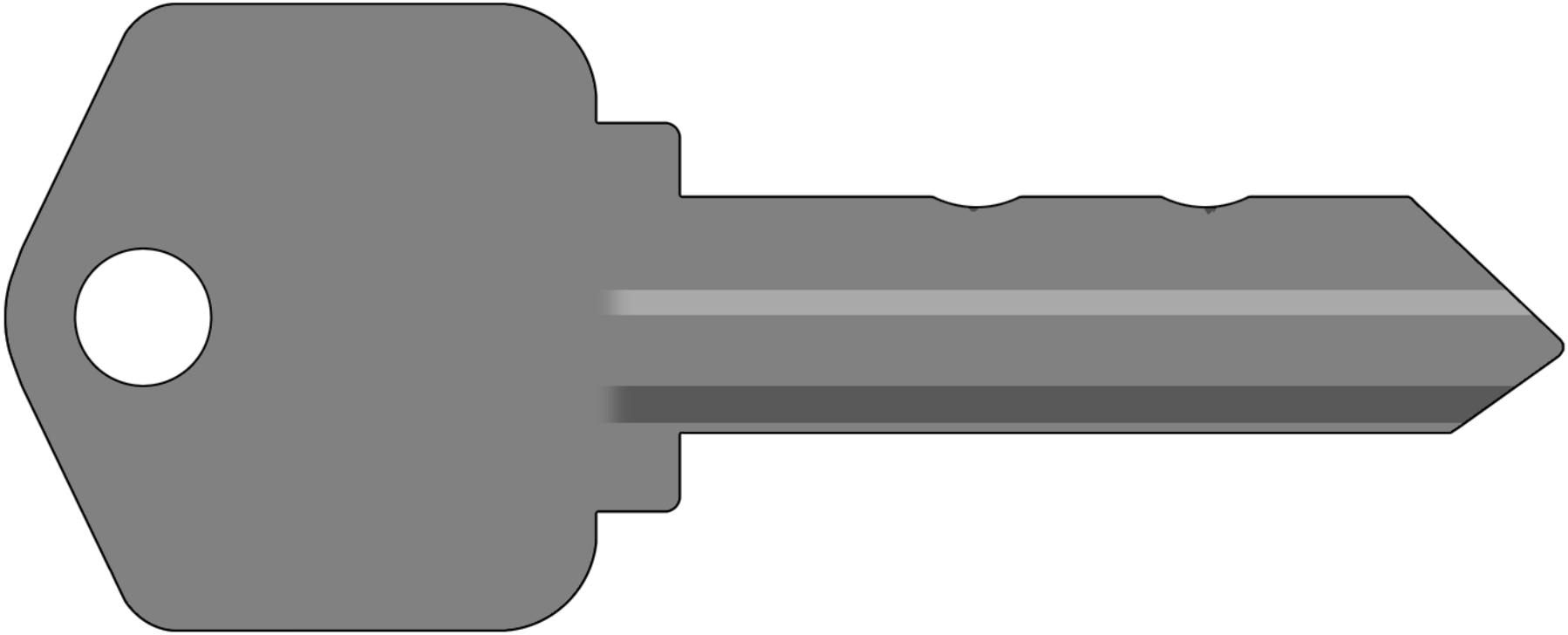
Impressioning – Stack 2 is still Binding



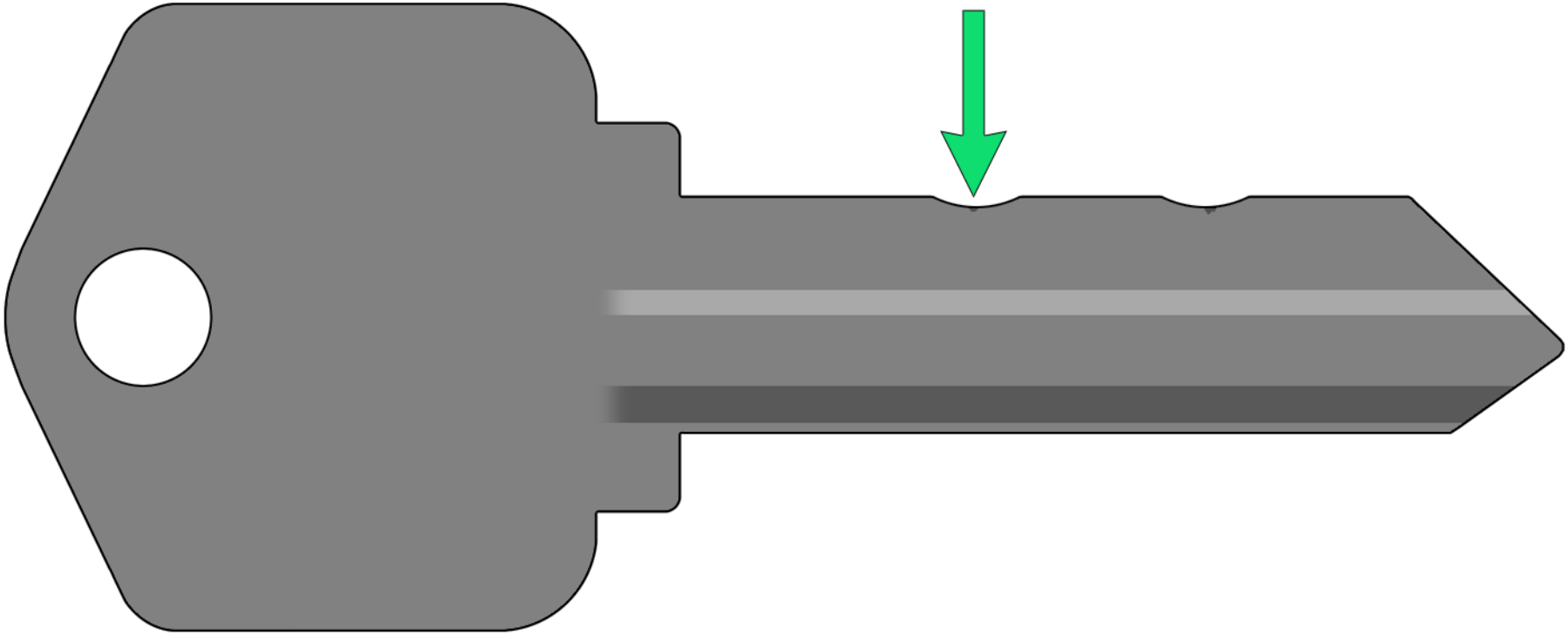
Impressioning – Stack 2 is still Rubbing



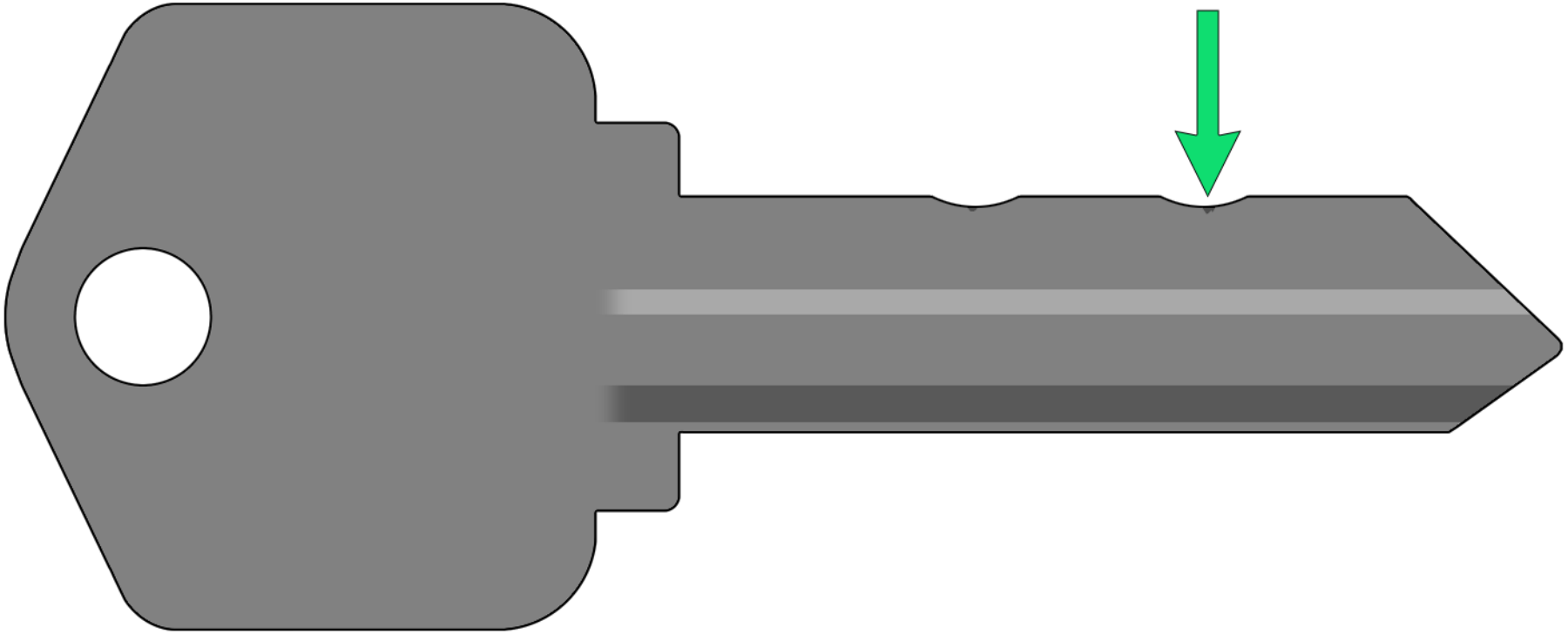
Impressioning – Continued Rub Marks



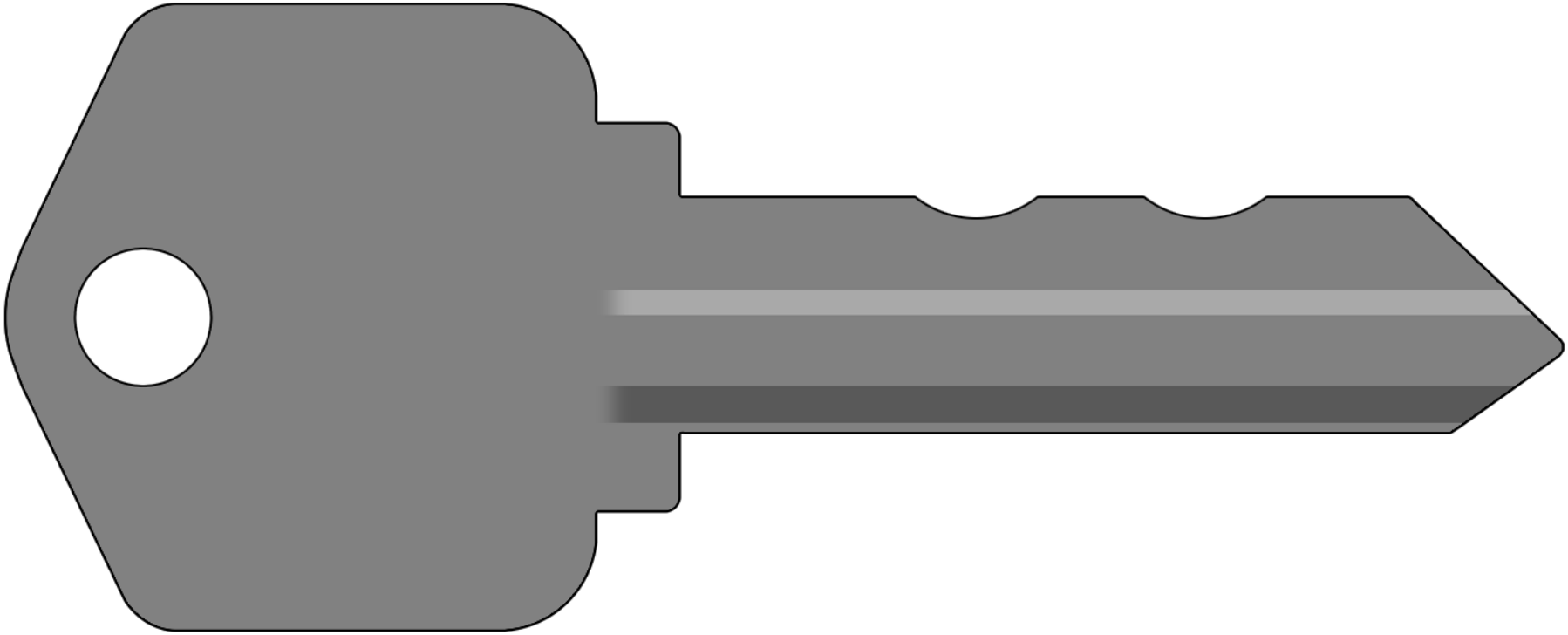
Impressioning – Continued Rub Marks



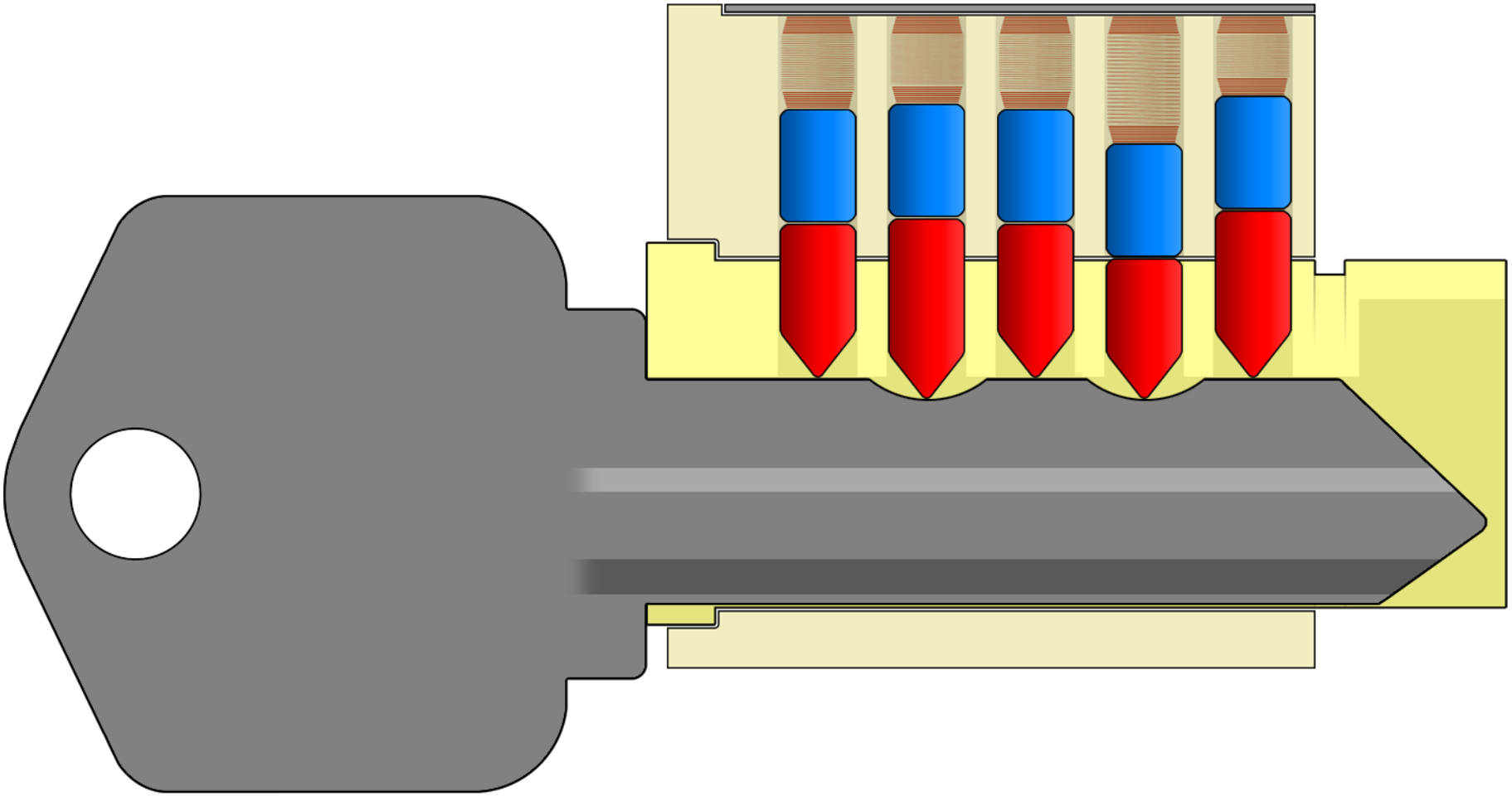
Impressioning – Continued Rub Marks



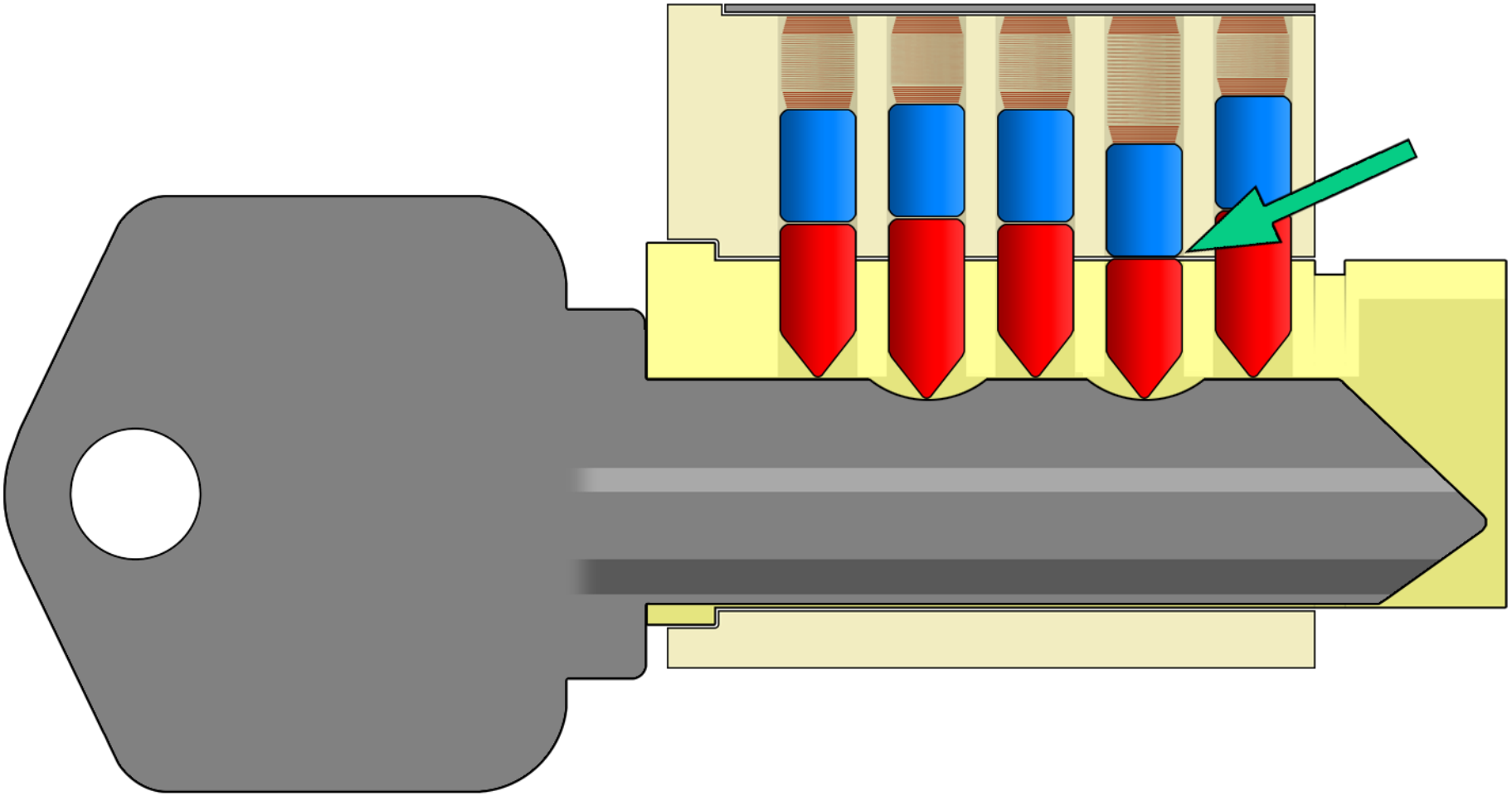
Impressioning – Continued Filing



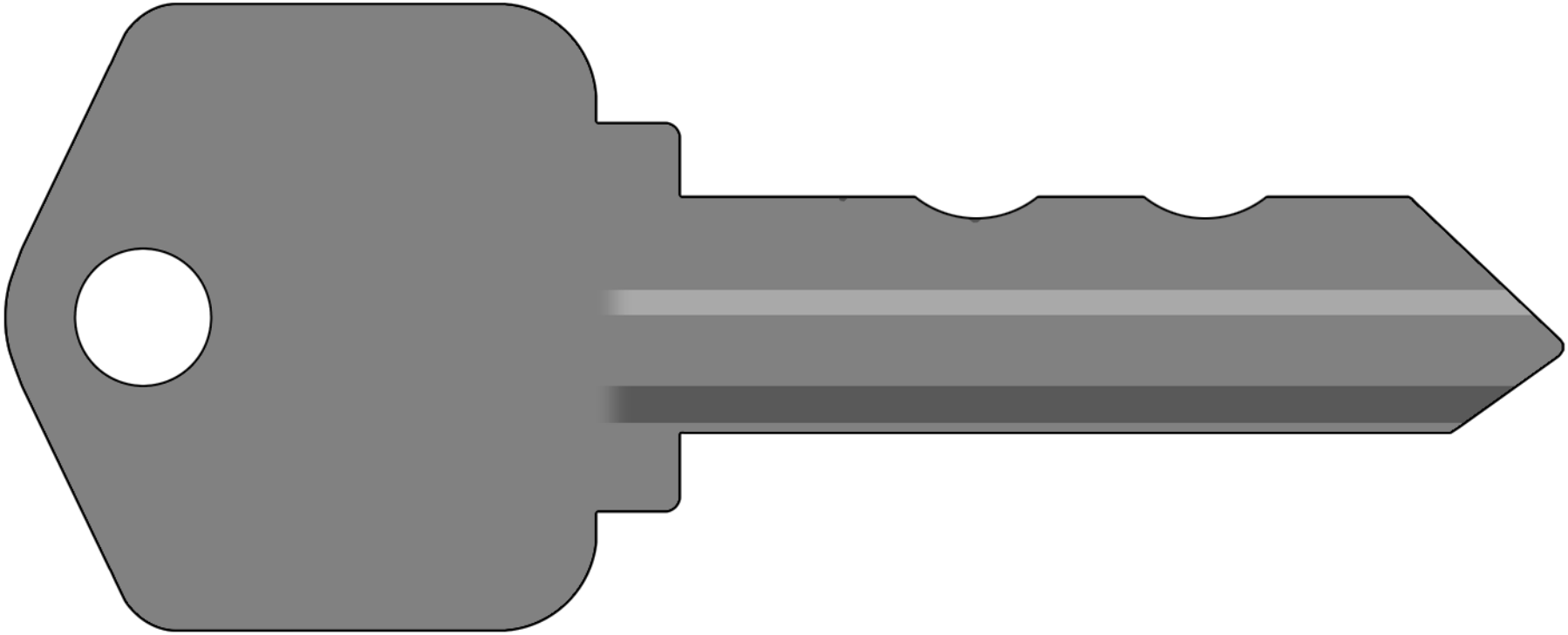
When the Key is Inserted Now…



Pin Stack Number 4 is No Longer Binding



You'll Know This Has Happened When *New* Marks Appear



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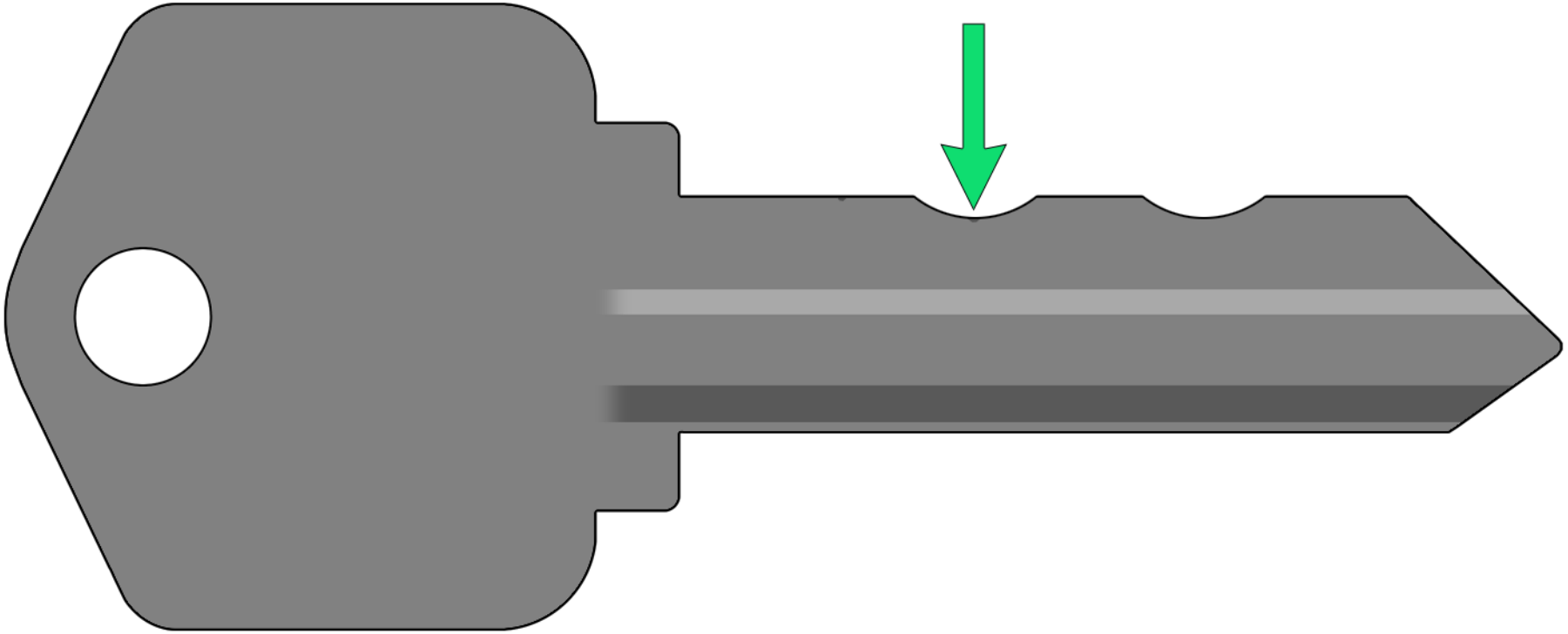

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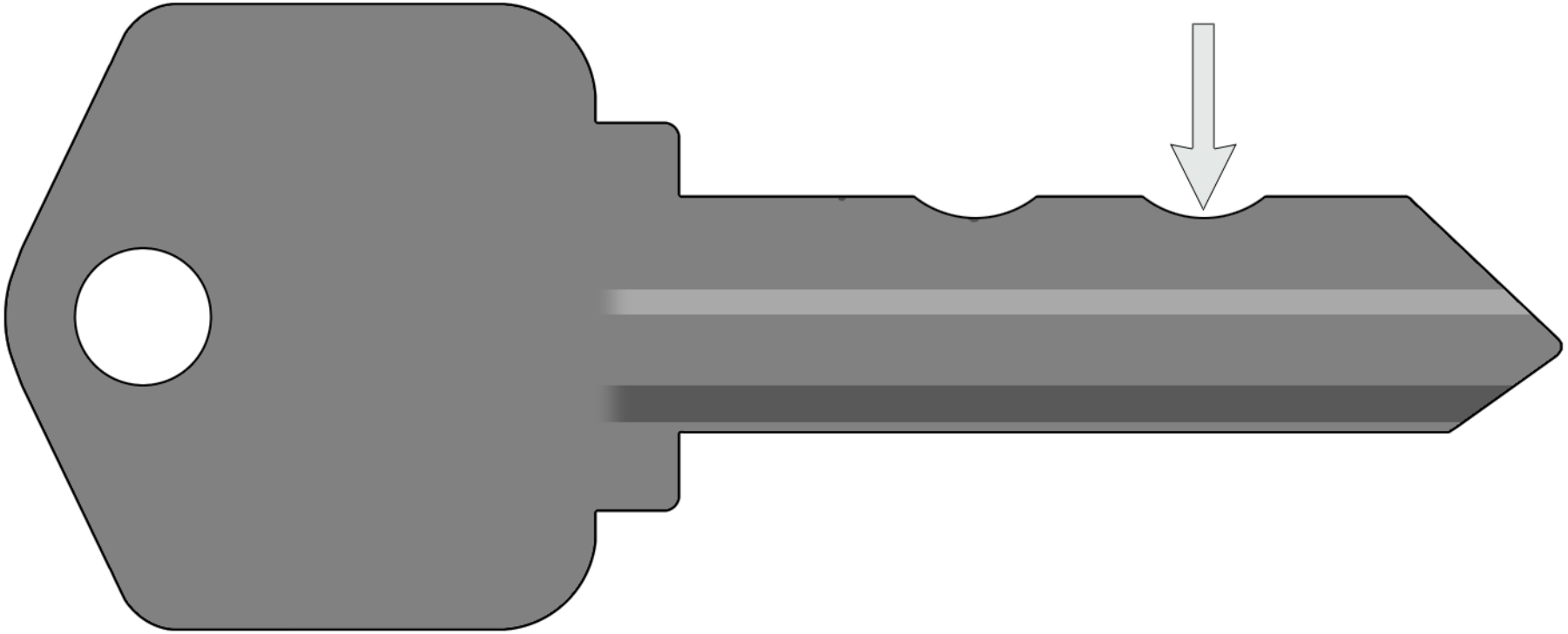
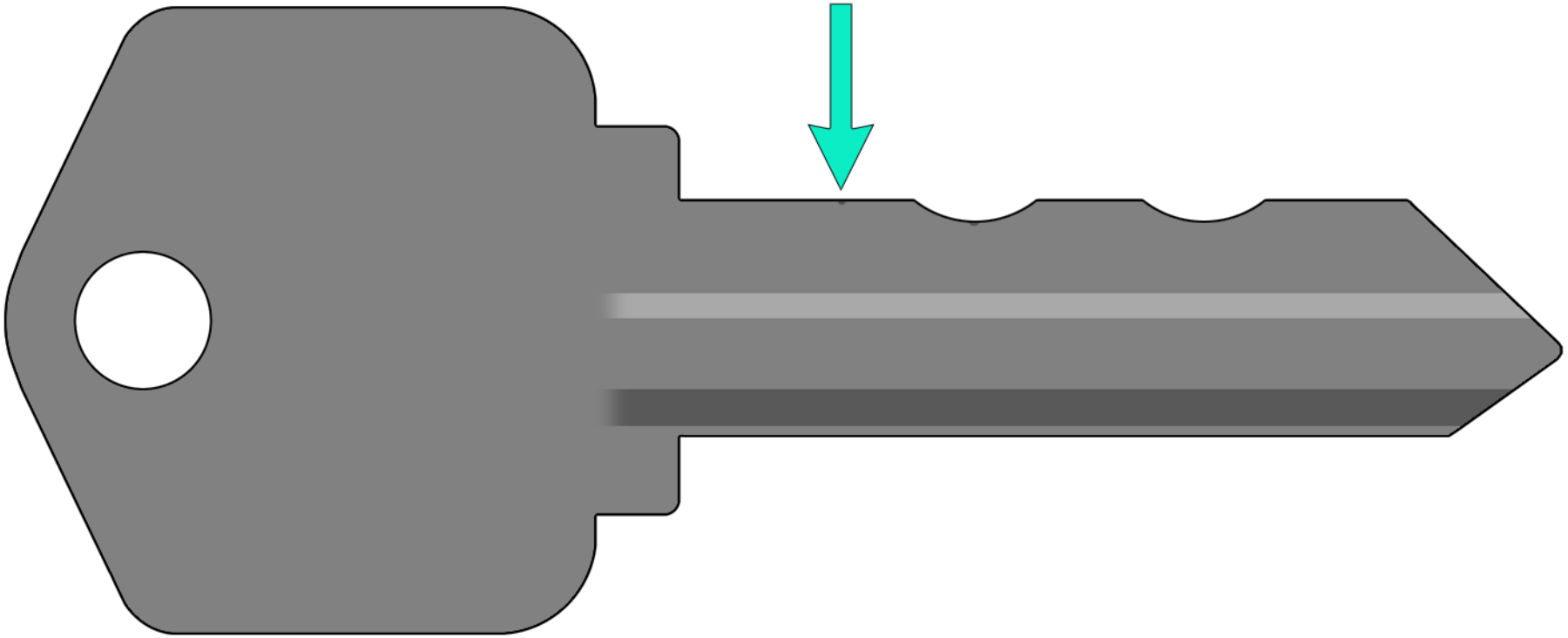
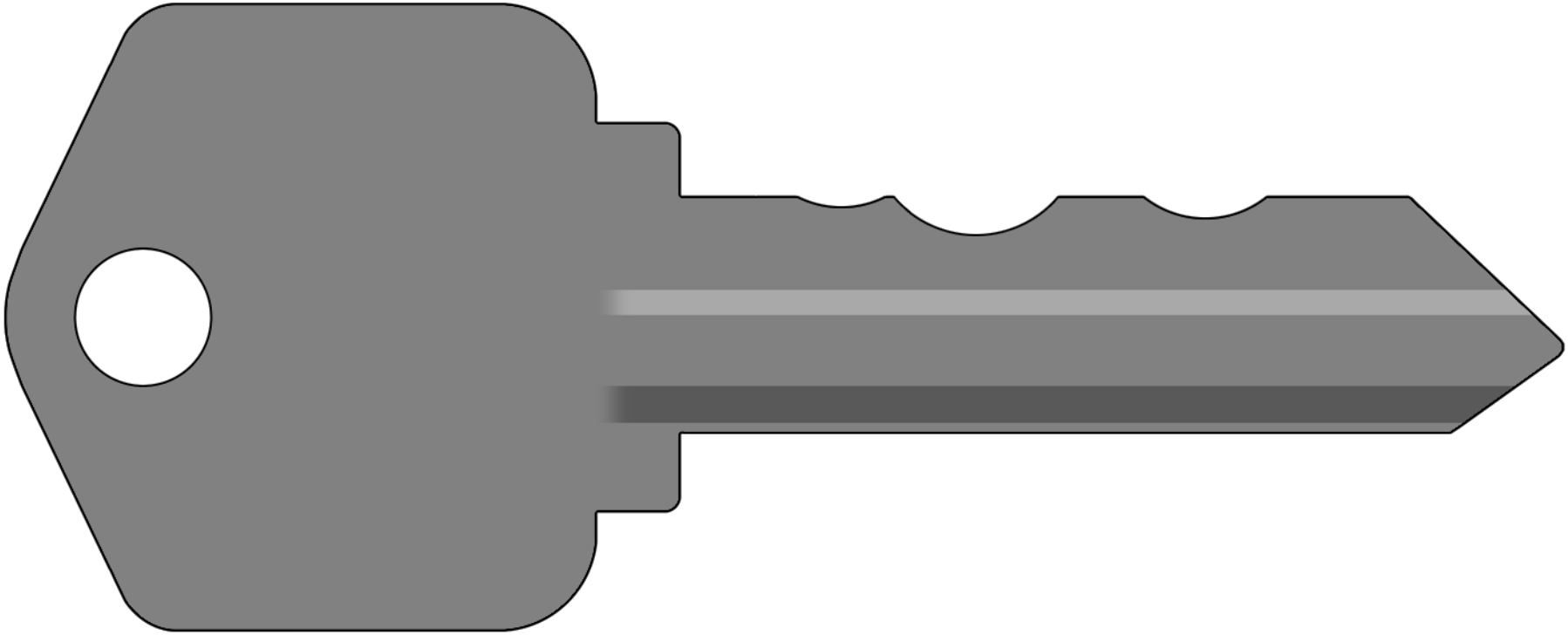


You'll Know This Has Happened When *New* Marks Appear



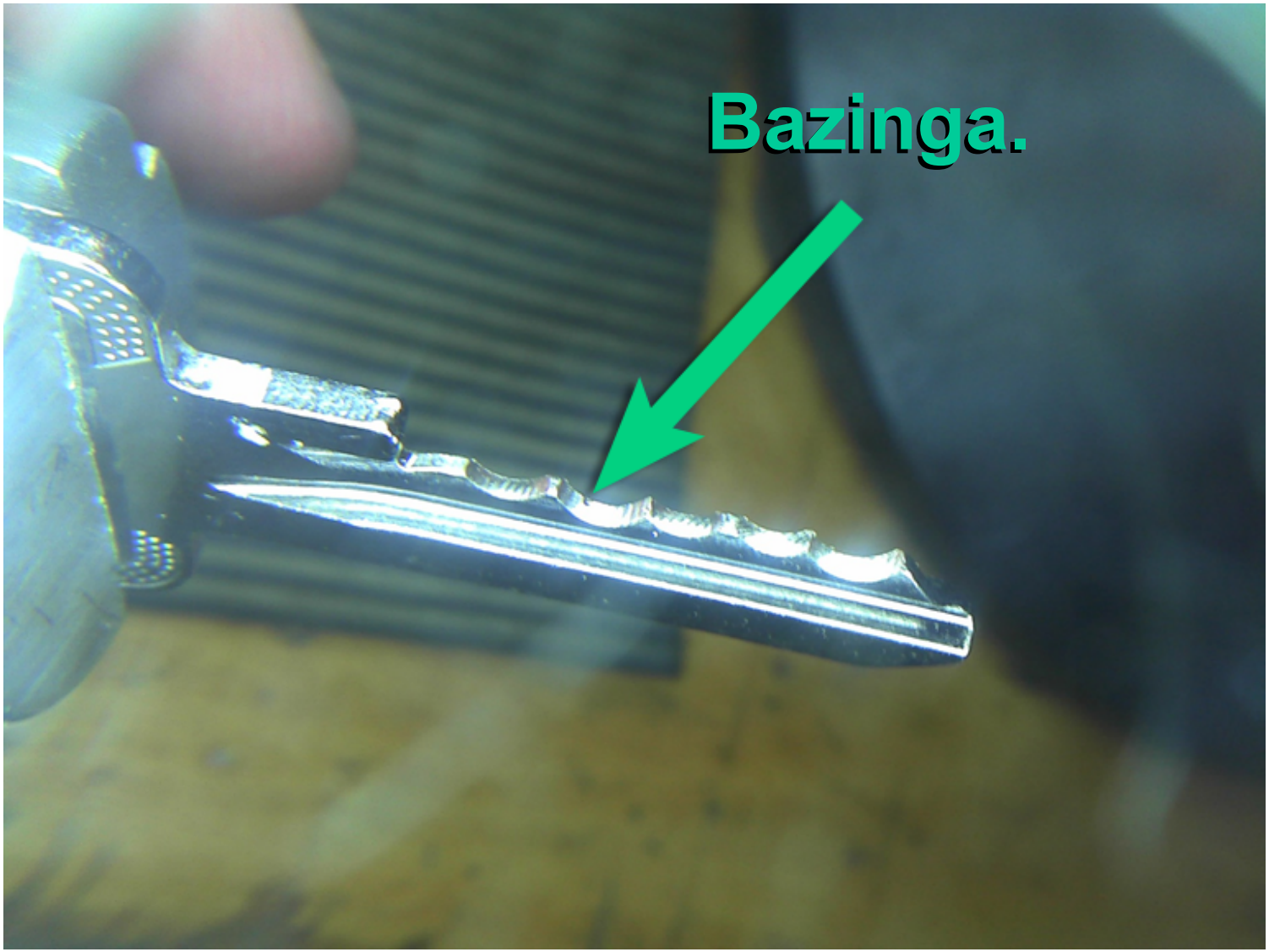
You'll Know This Has Happened When *New* Marks Appear



It's Delicate & Intricate Work

It's Delicate & Intricate Work

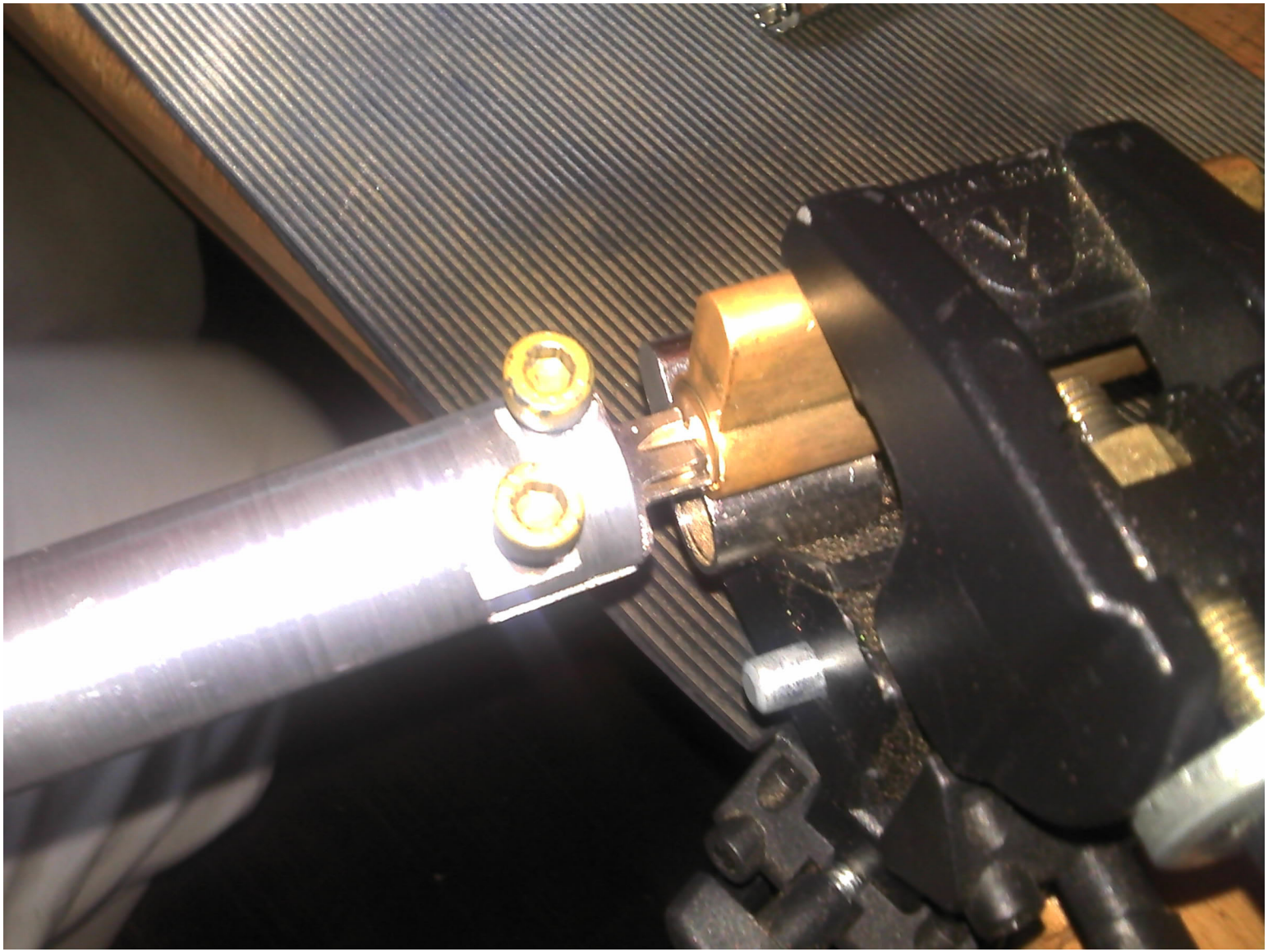
It's Delicate & Intricate Work



It's Delicate & Intricate Work

It's Delicate & Intricate Work

Open !

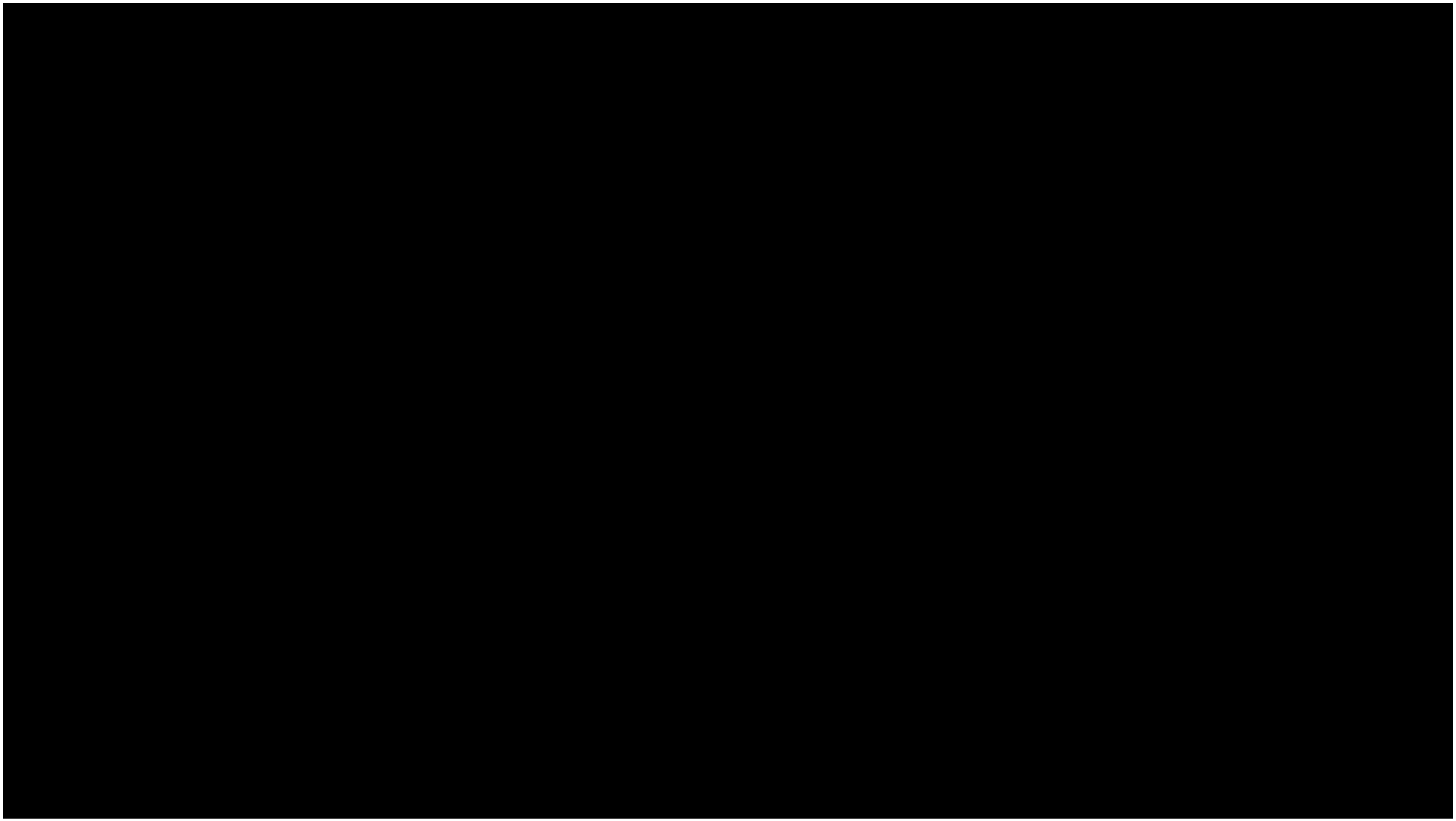


Open !

Open !

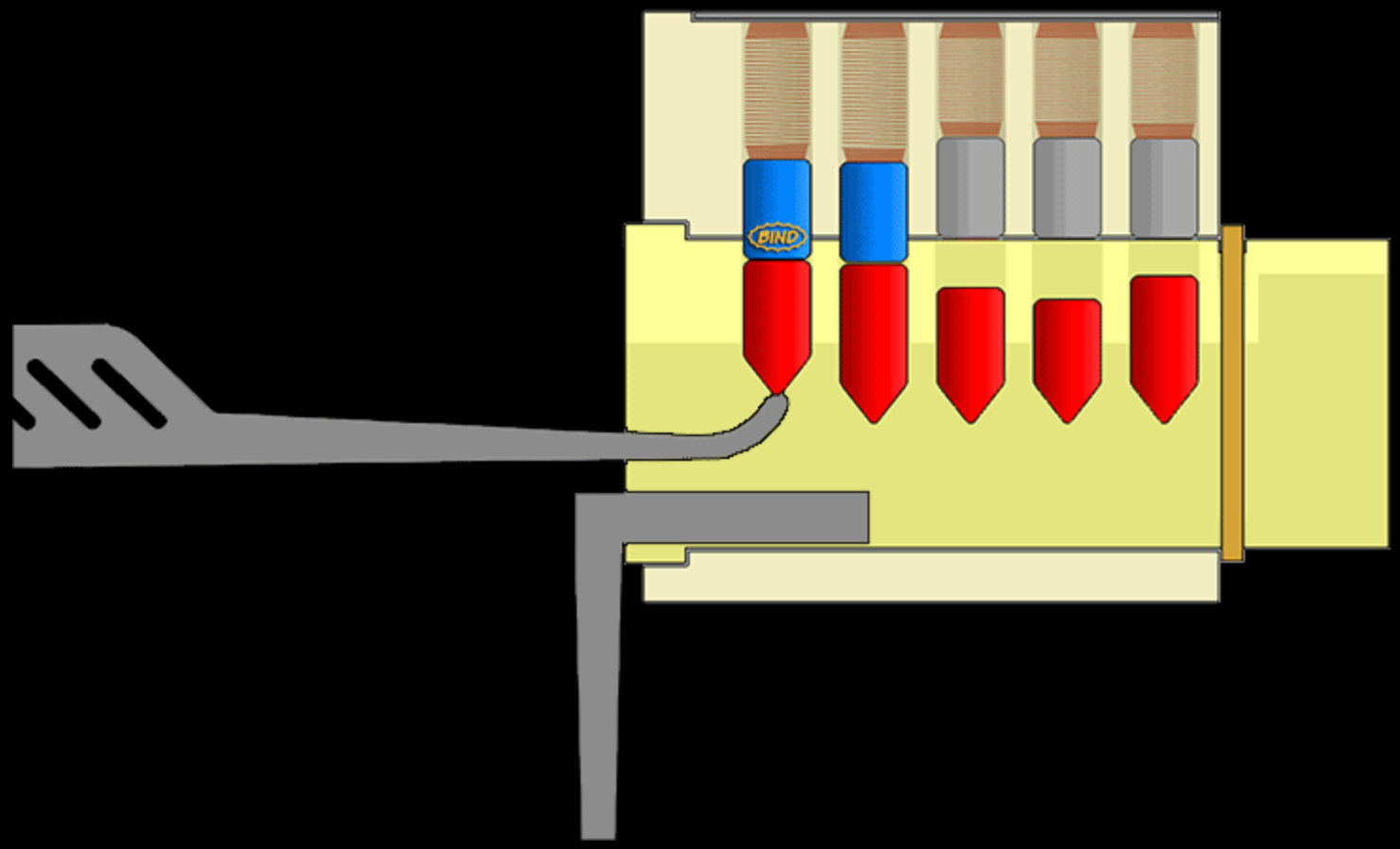
Impressioning Competitions

Impressioning Competitions

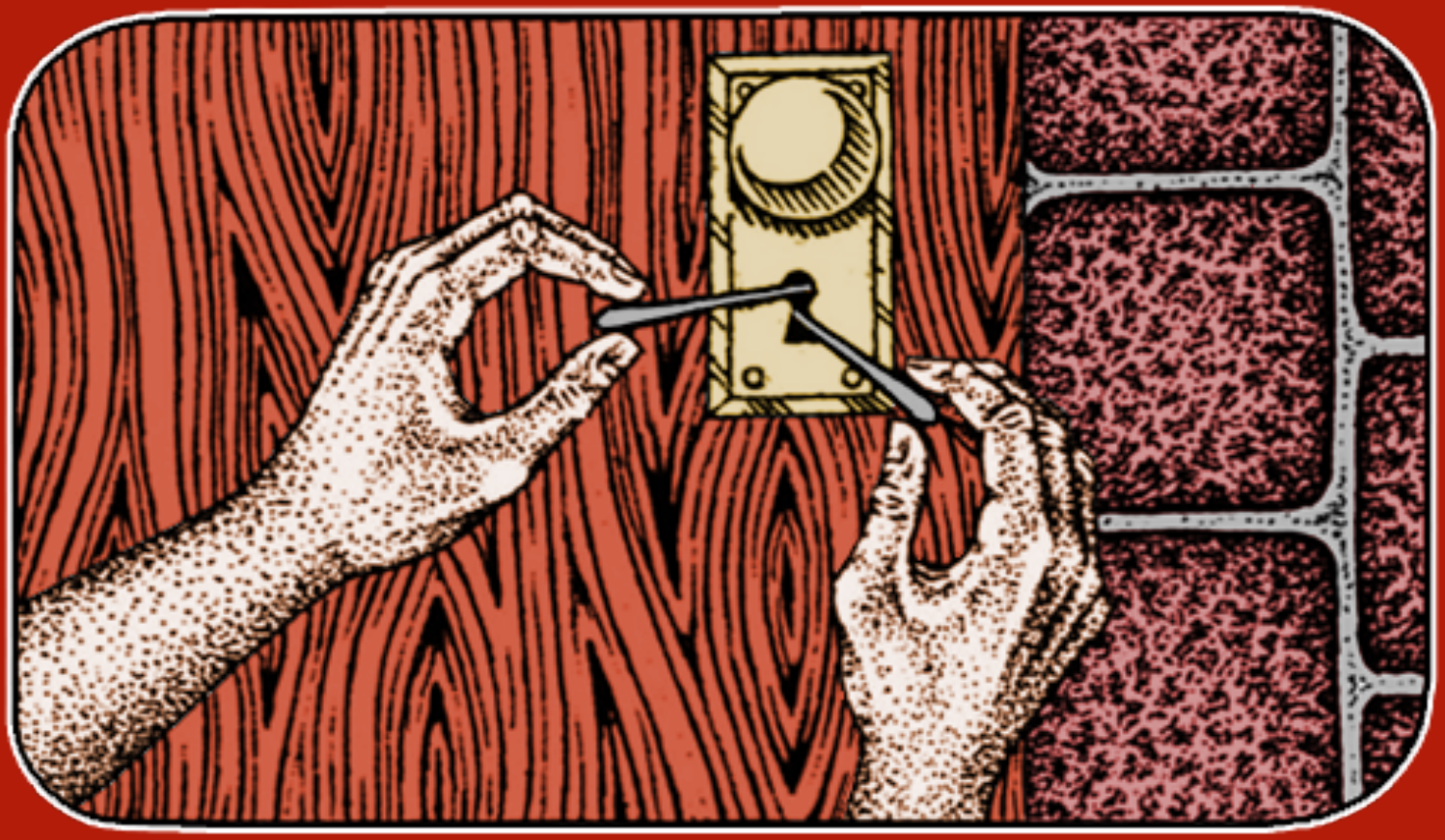


Impressioning Competitions

Questions?



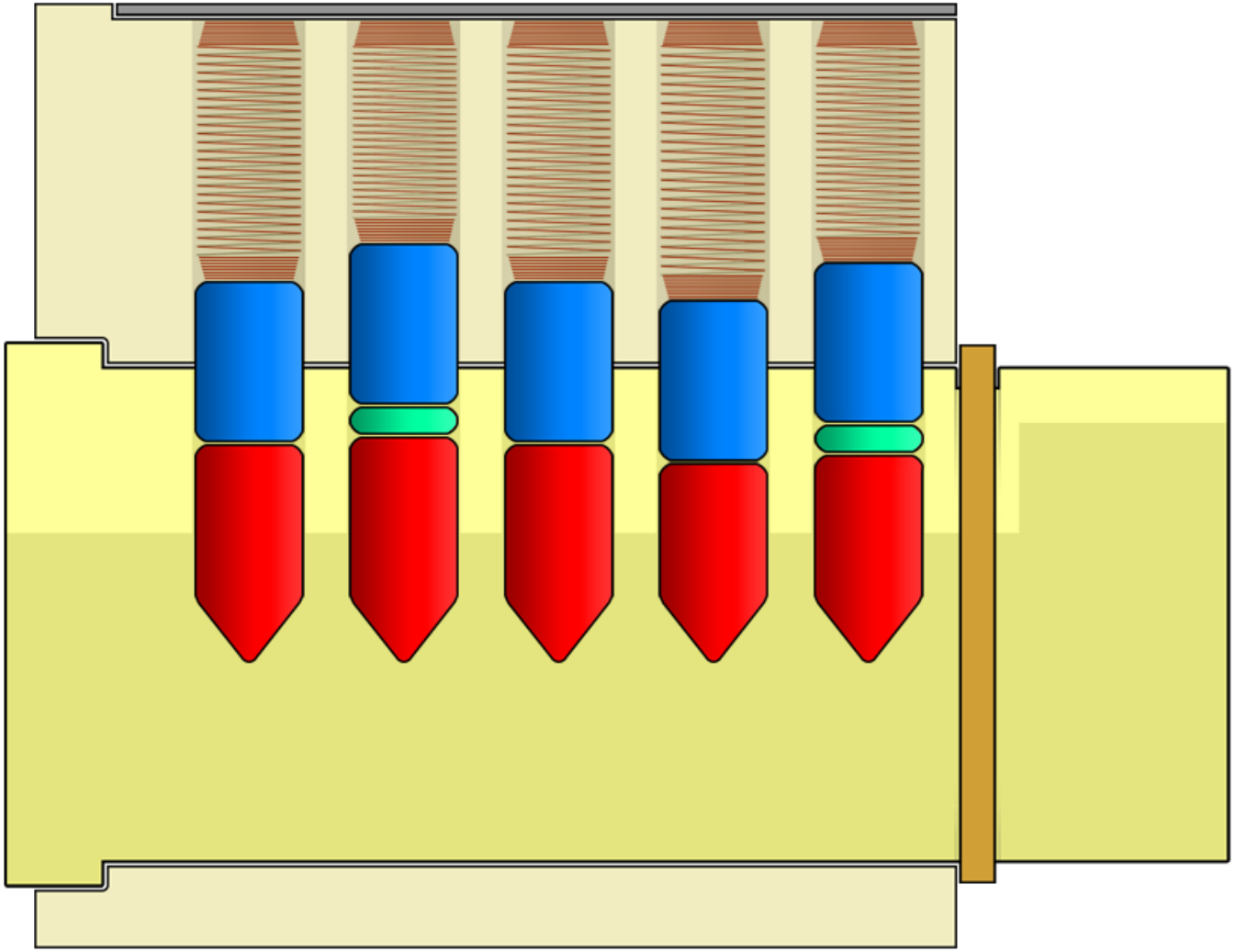
Master-Keyed Systems



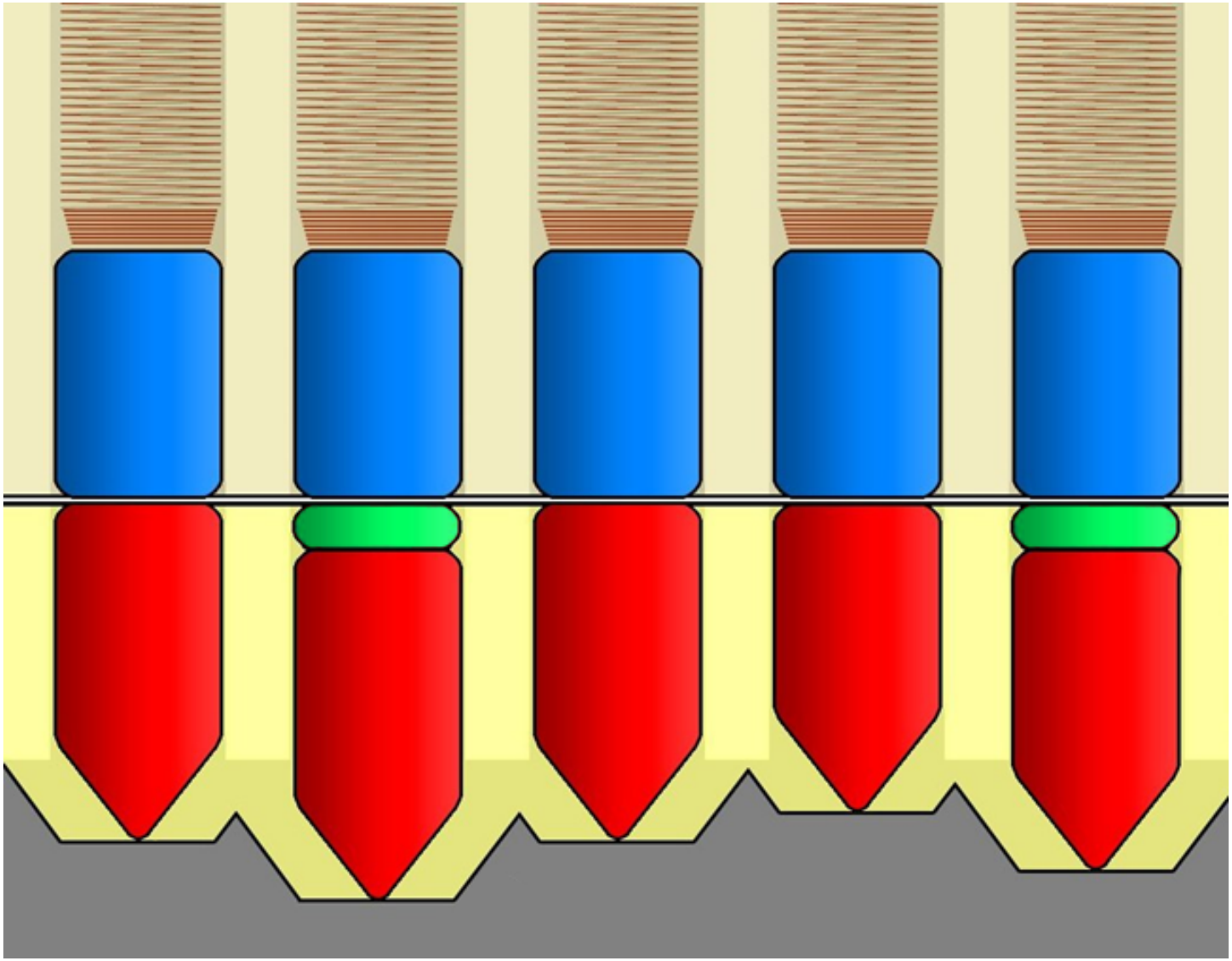
Master-Keyed Systems

- Varied permissions
- Sometimes keyway c
- Privilege Escalation

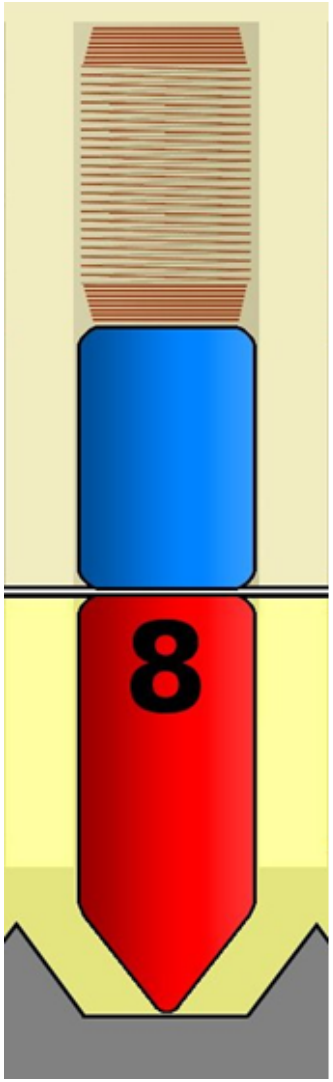
Master-Keyed Systems

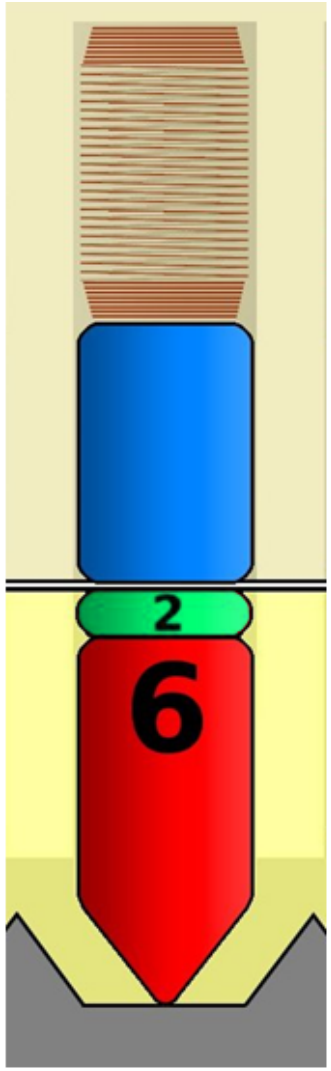


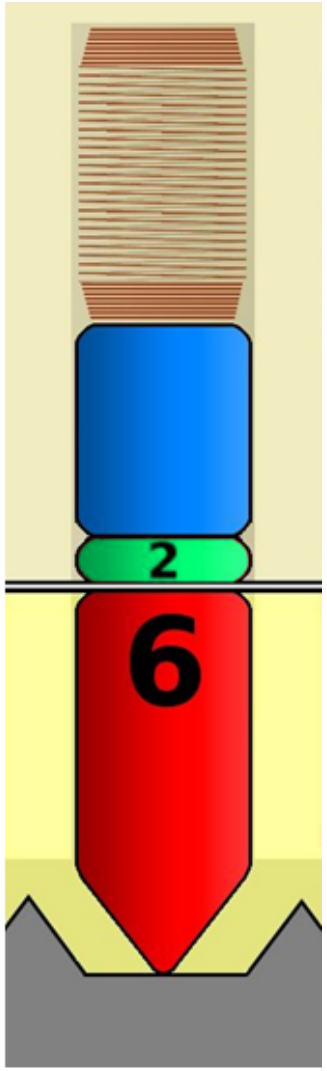
Master-Keyed Systems



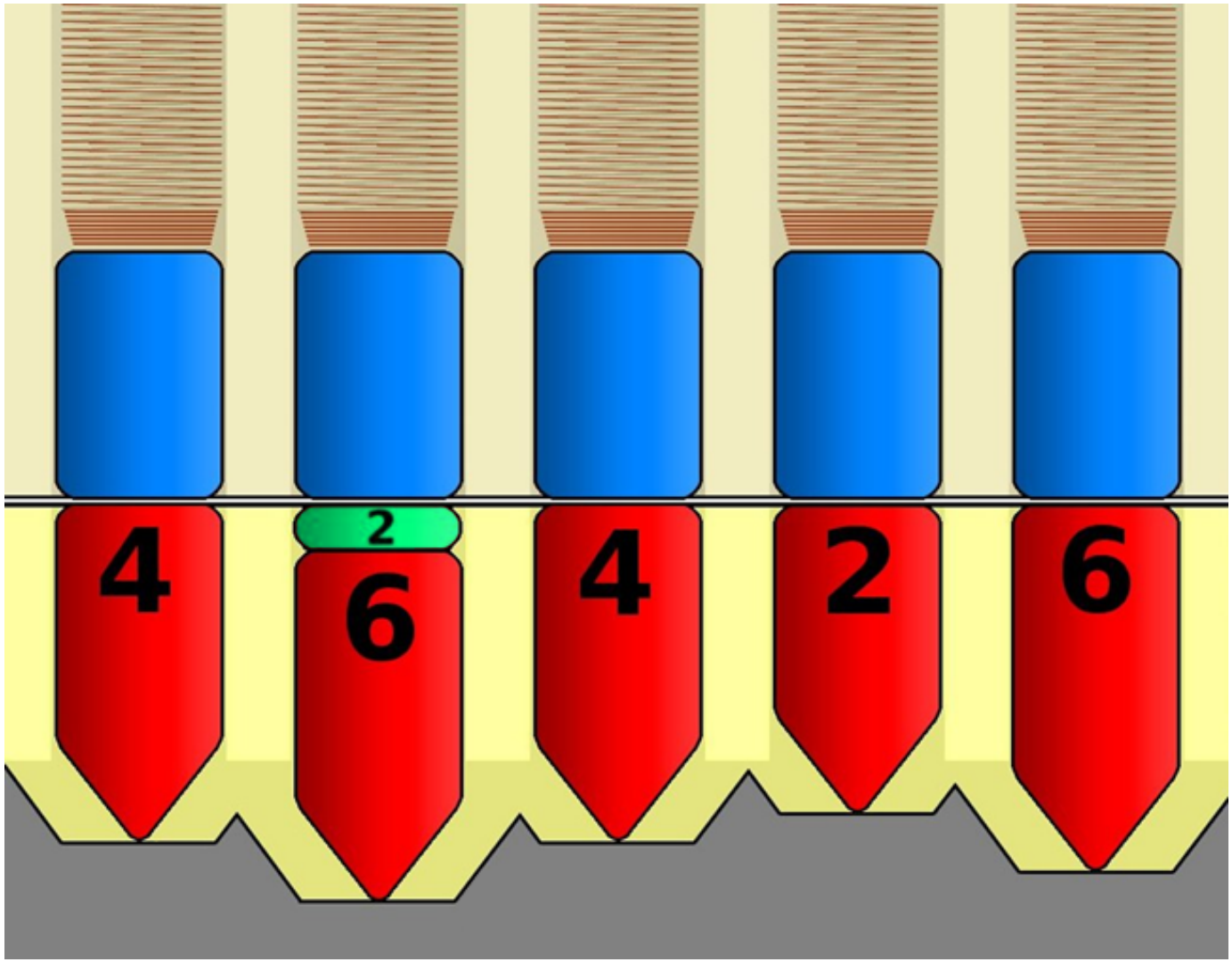
Master-Keyed Systems







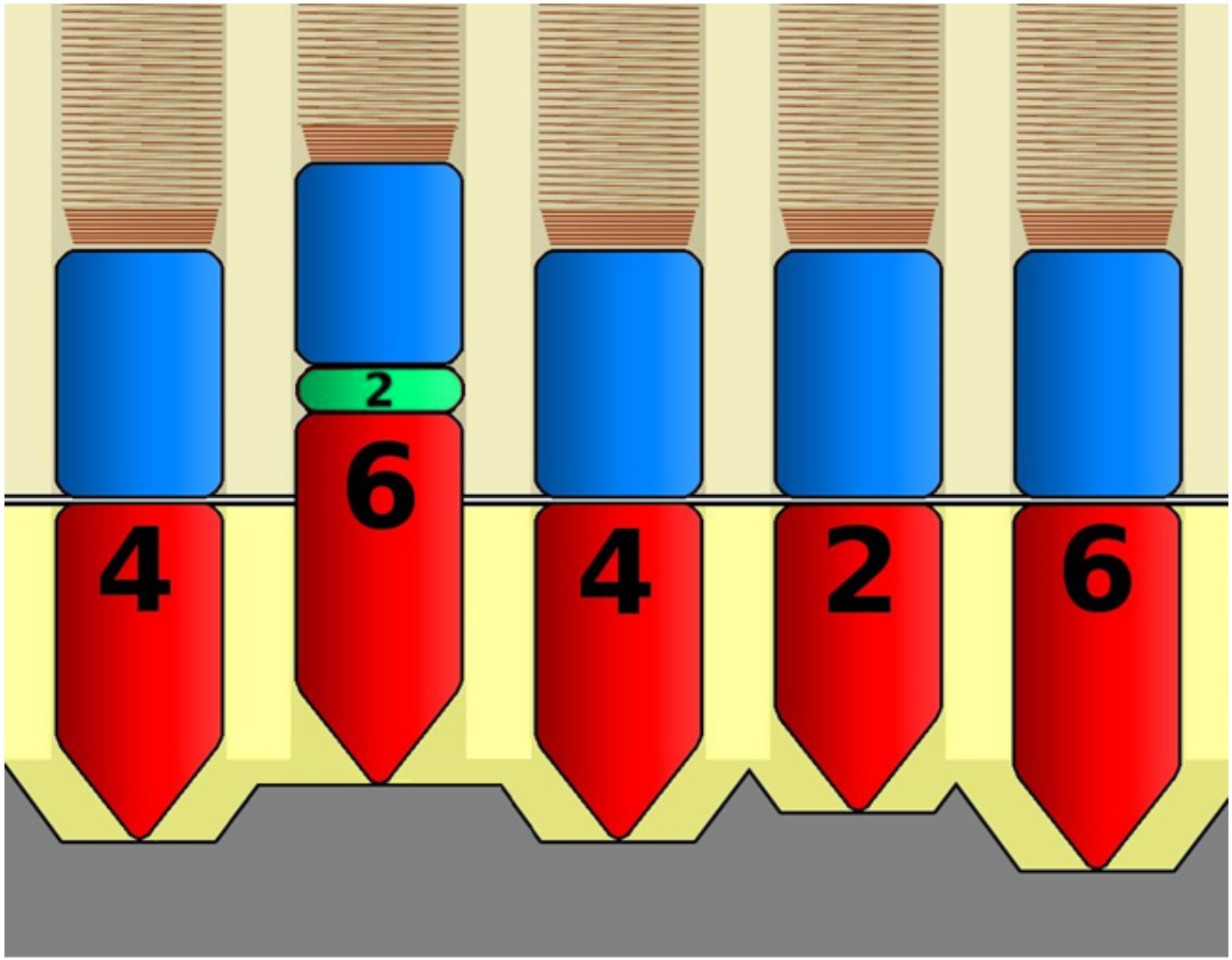
Finding the Master Bitting Depths



8 *Original key cut depth...*

Lock opens

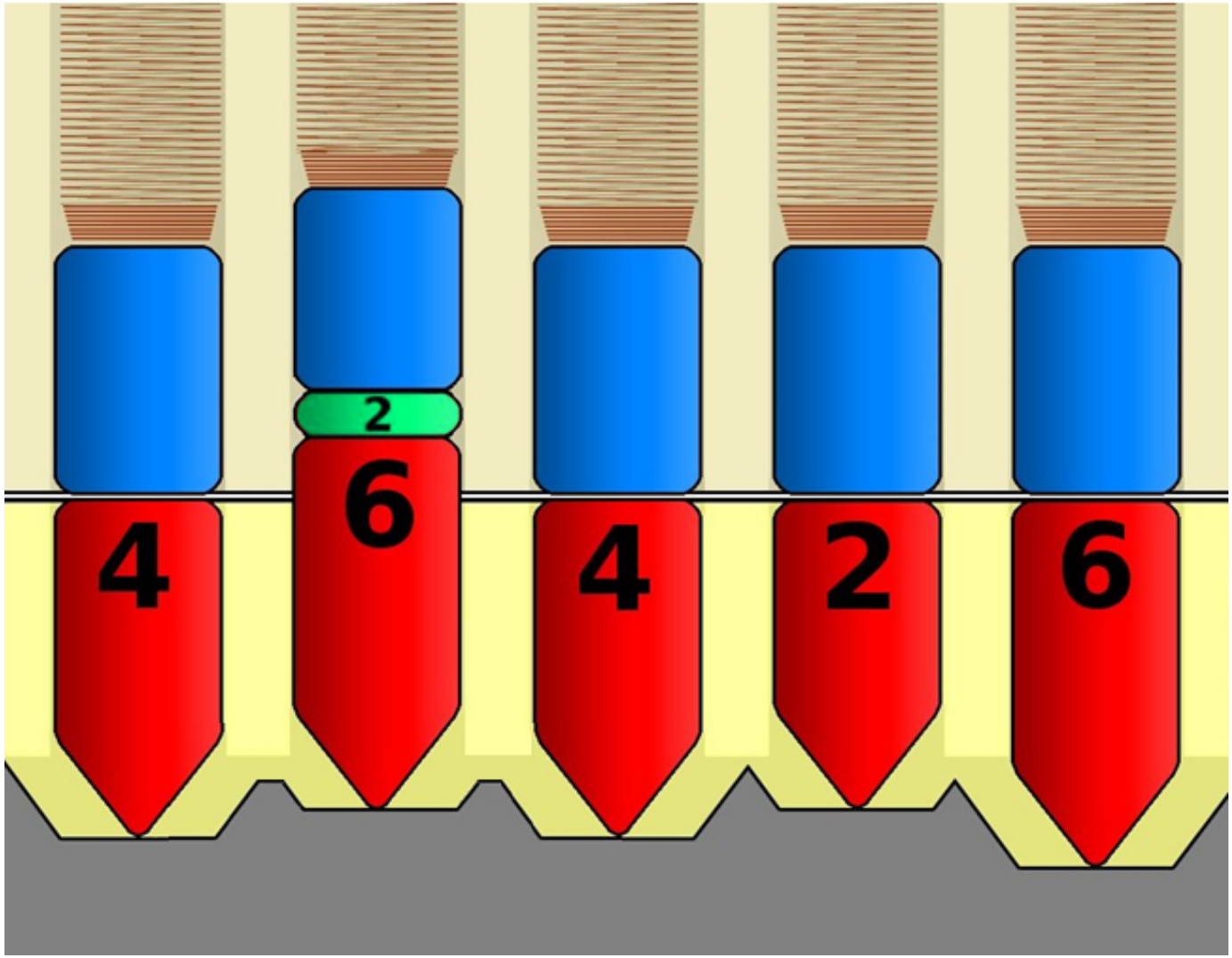
Finding the Master Bitting Depths



0 ***Leave this position uncut...***

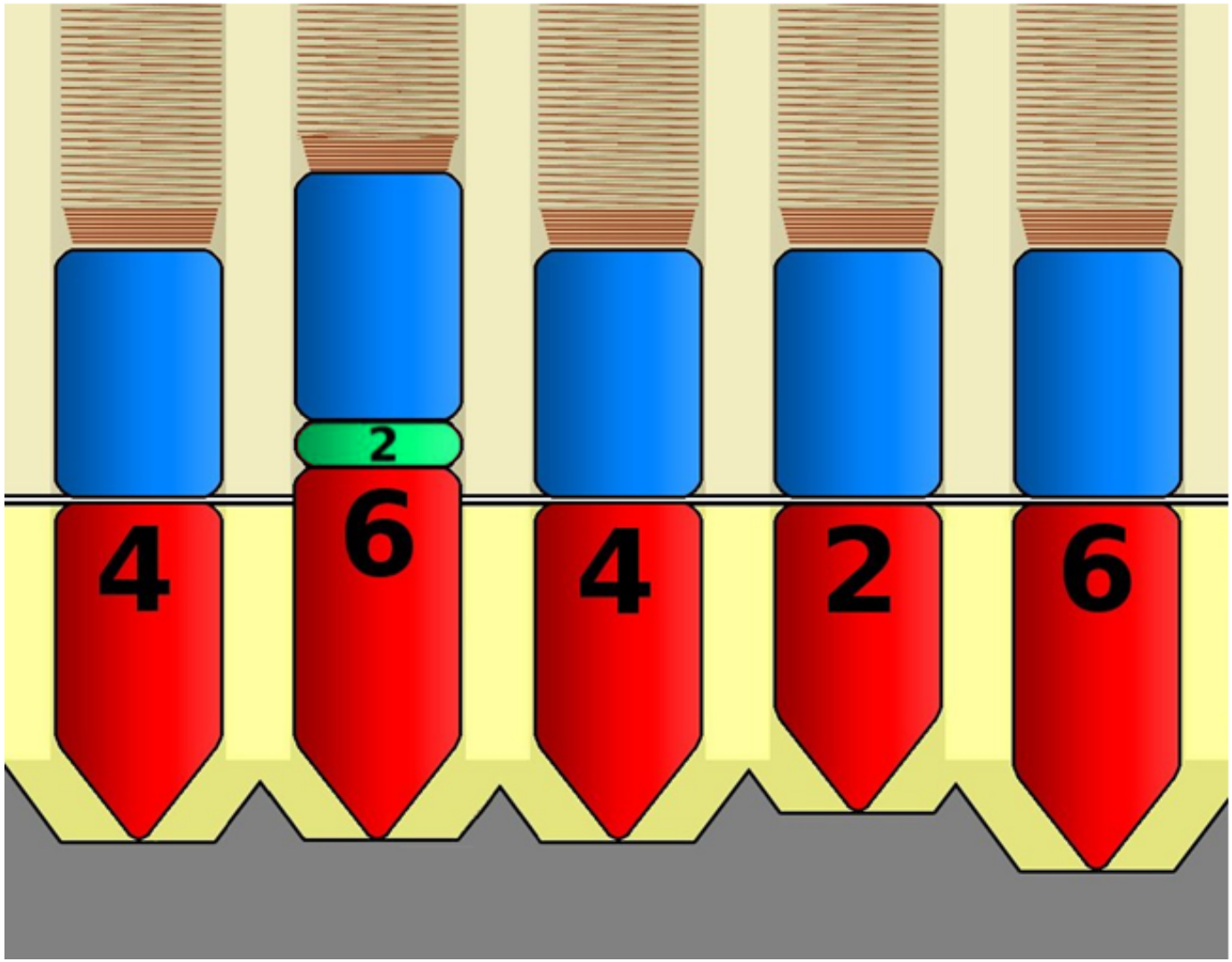
Lock does not open

Finding the Master Bitting Depths



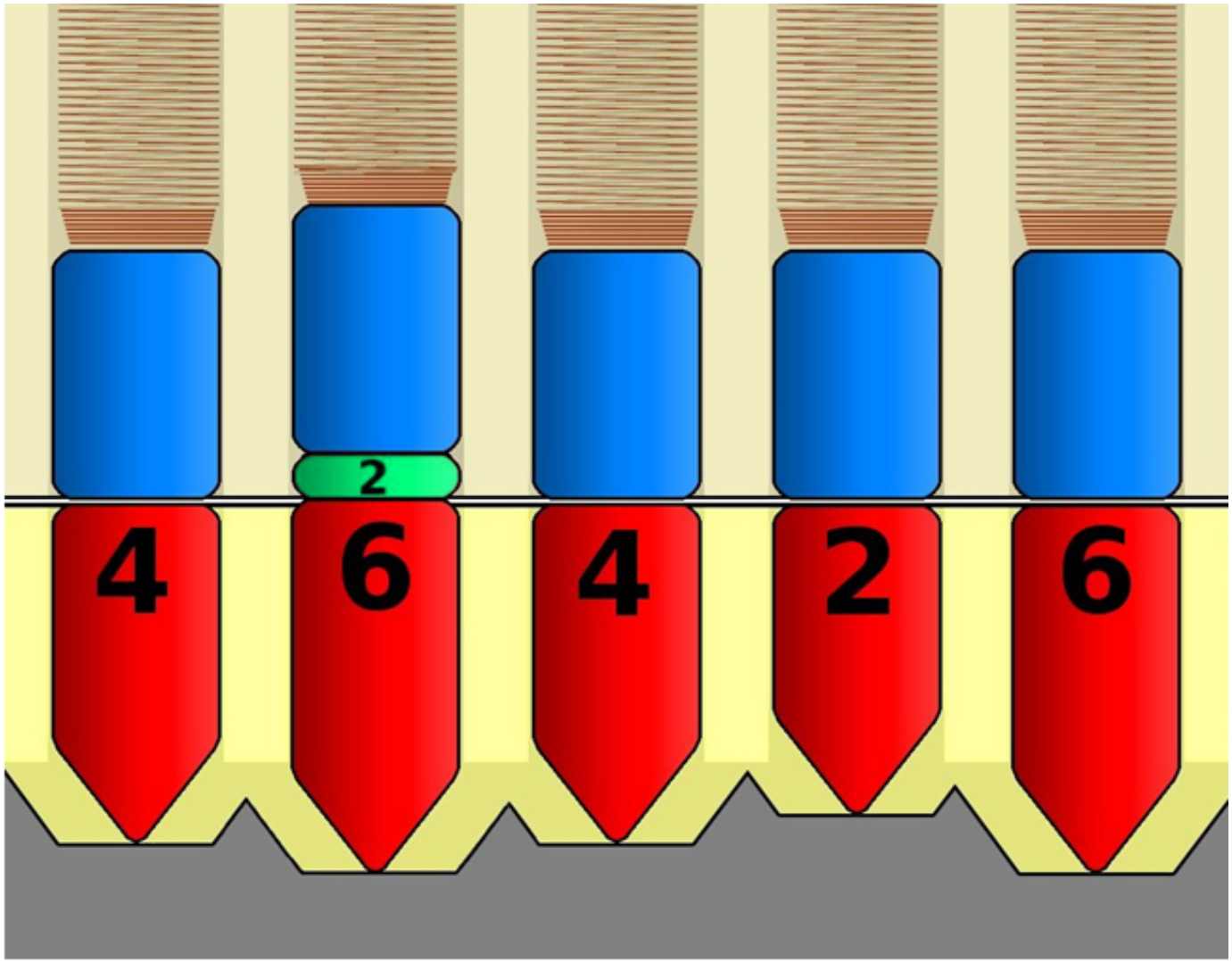
2 ***Cut down slightly... Lock does not open***

Finding the Master Bitting Depths



4 ***Cut down a little more... Lock still does not open***

Finding the Master Bitting Depths



6 ***Cut down more... Lock opens!***

Finding the Master Bitting Depths

"Master-Keyed Lock Vulnerability"

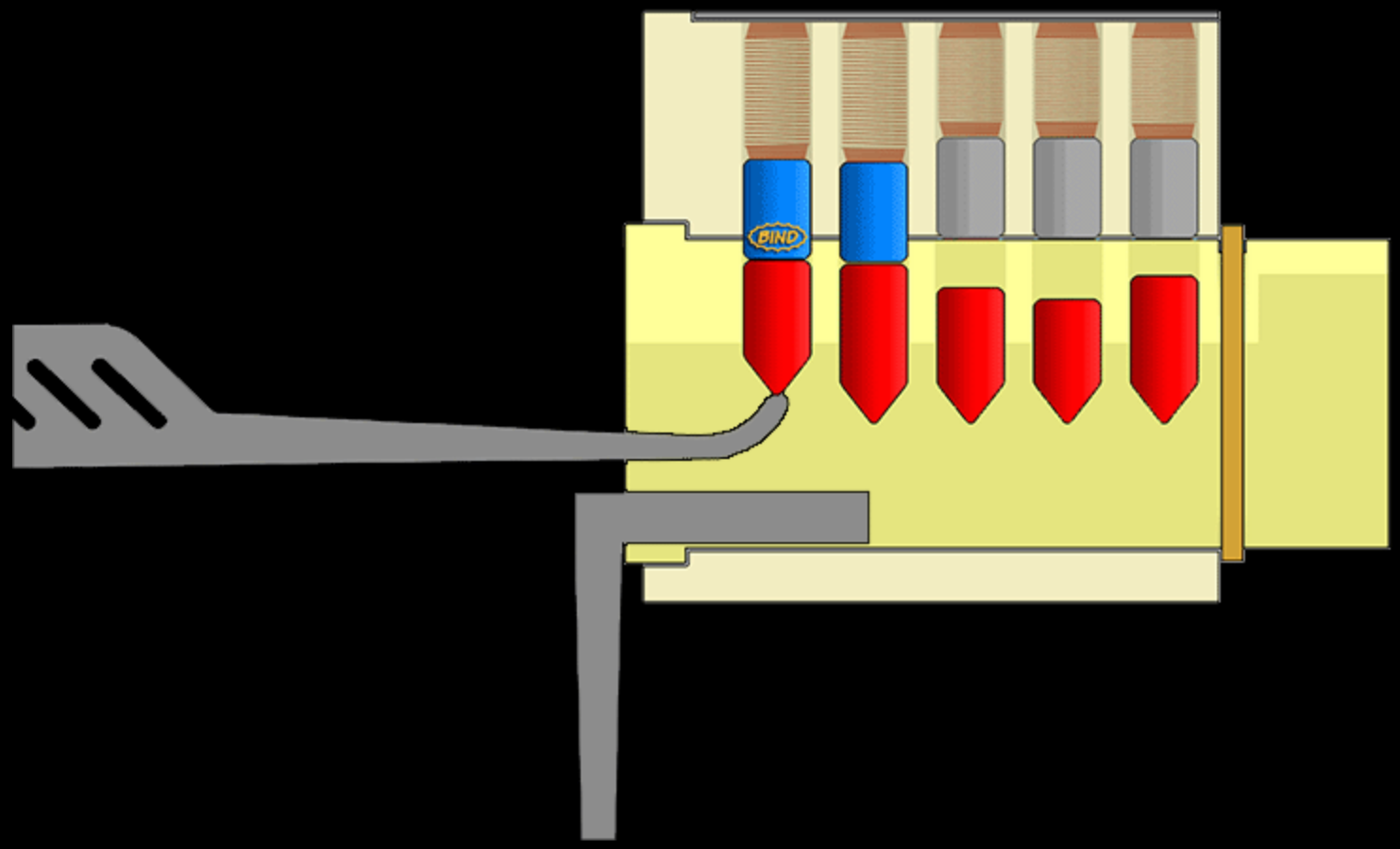
by Matt Blaze

2003-01-27

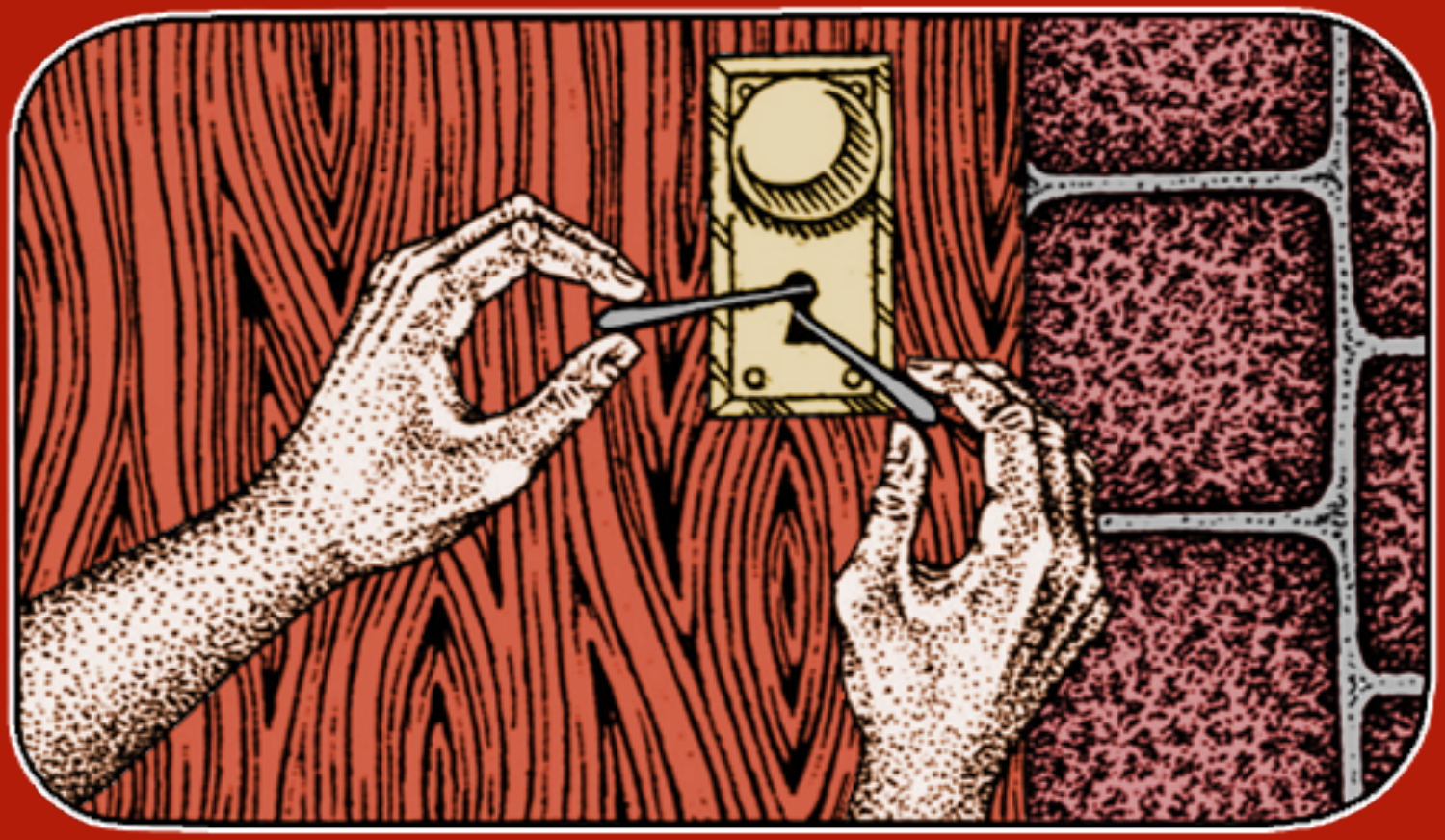
http://www.crypto.com/papers/mk.pdf

http://www.crypto.com/masterkey.html

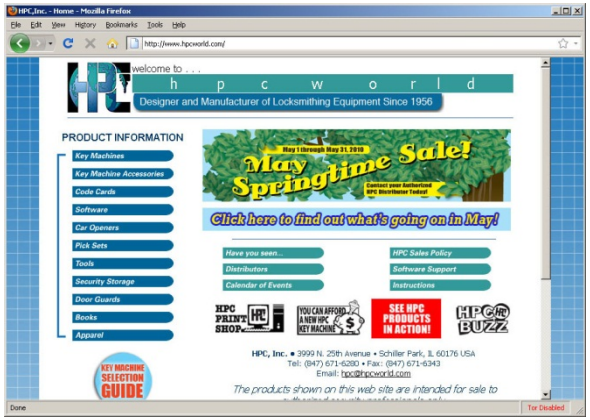
Questions?

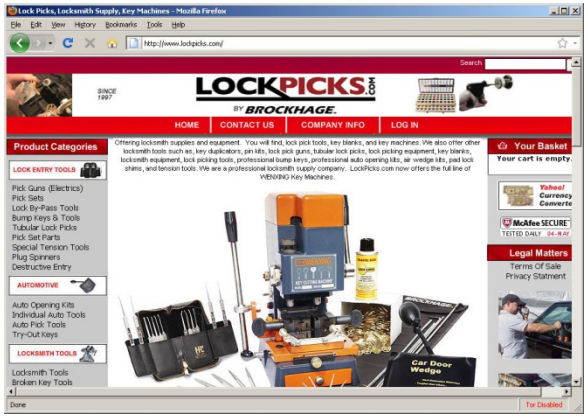


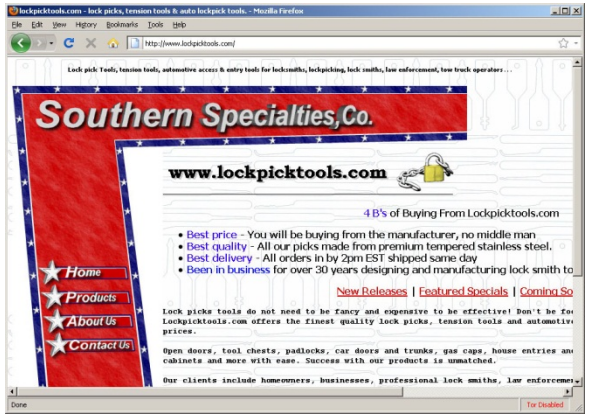
Distinguishing Picks



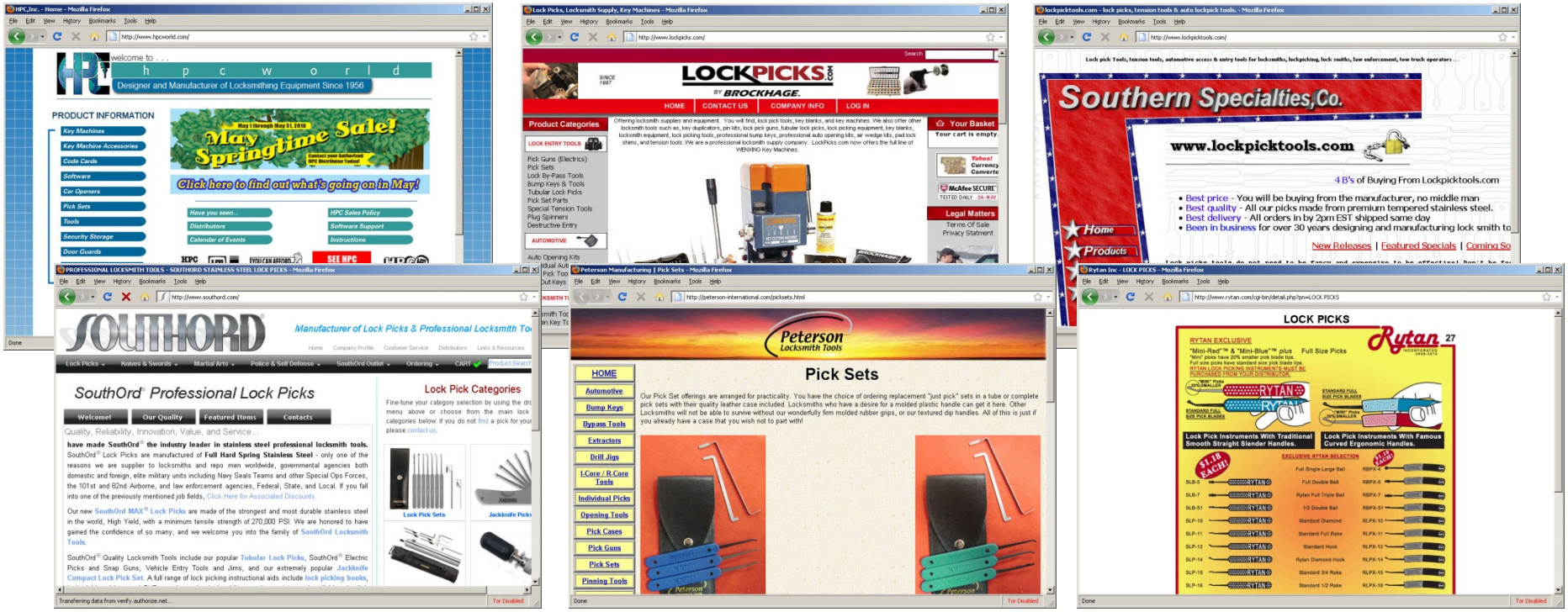
There are many lockpick vendors…



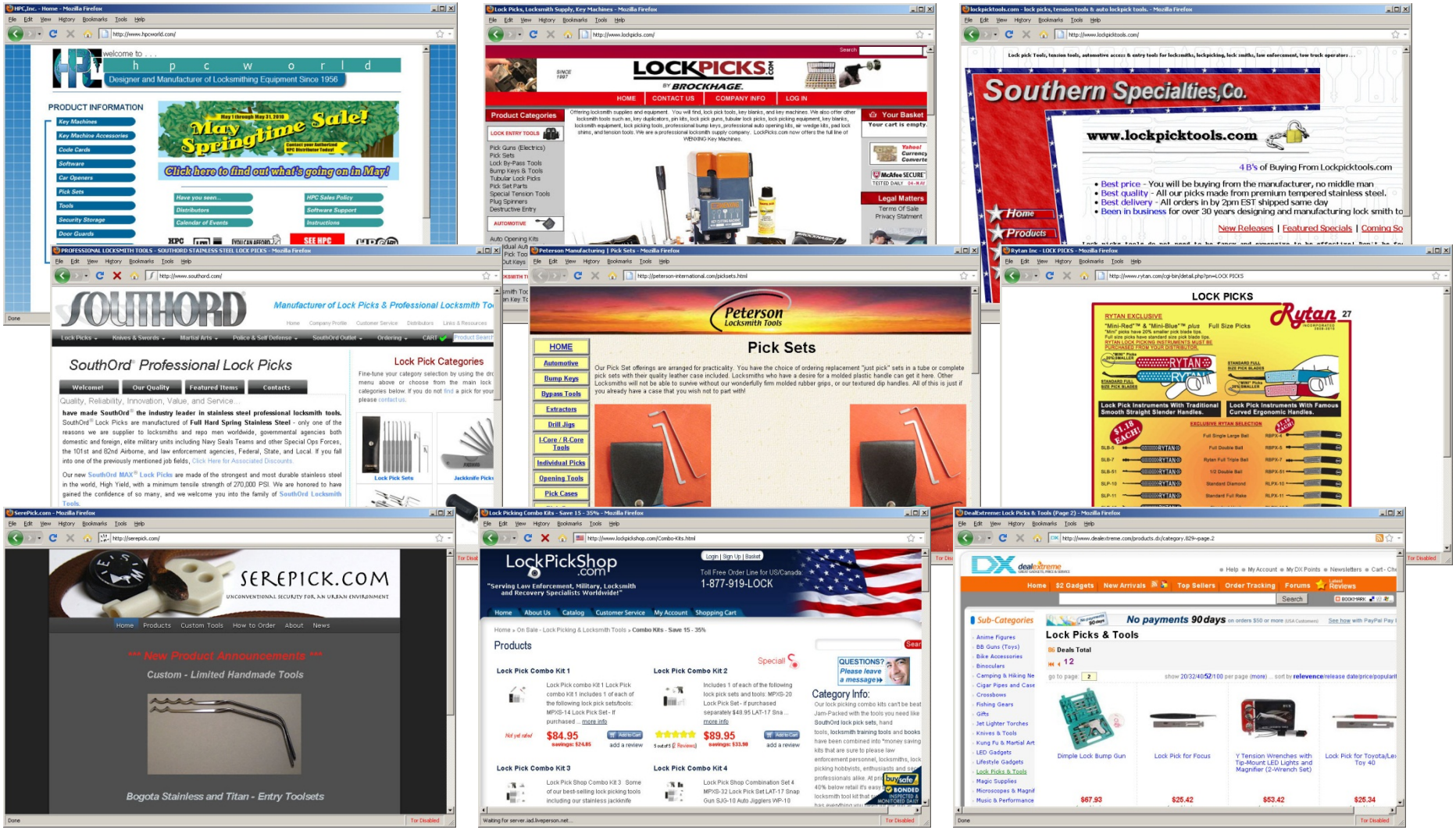




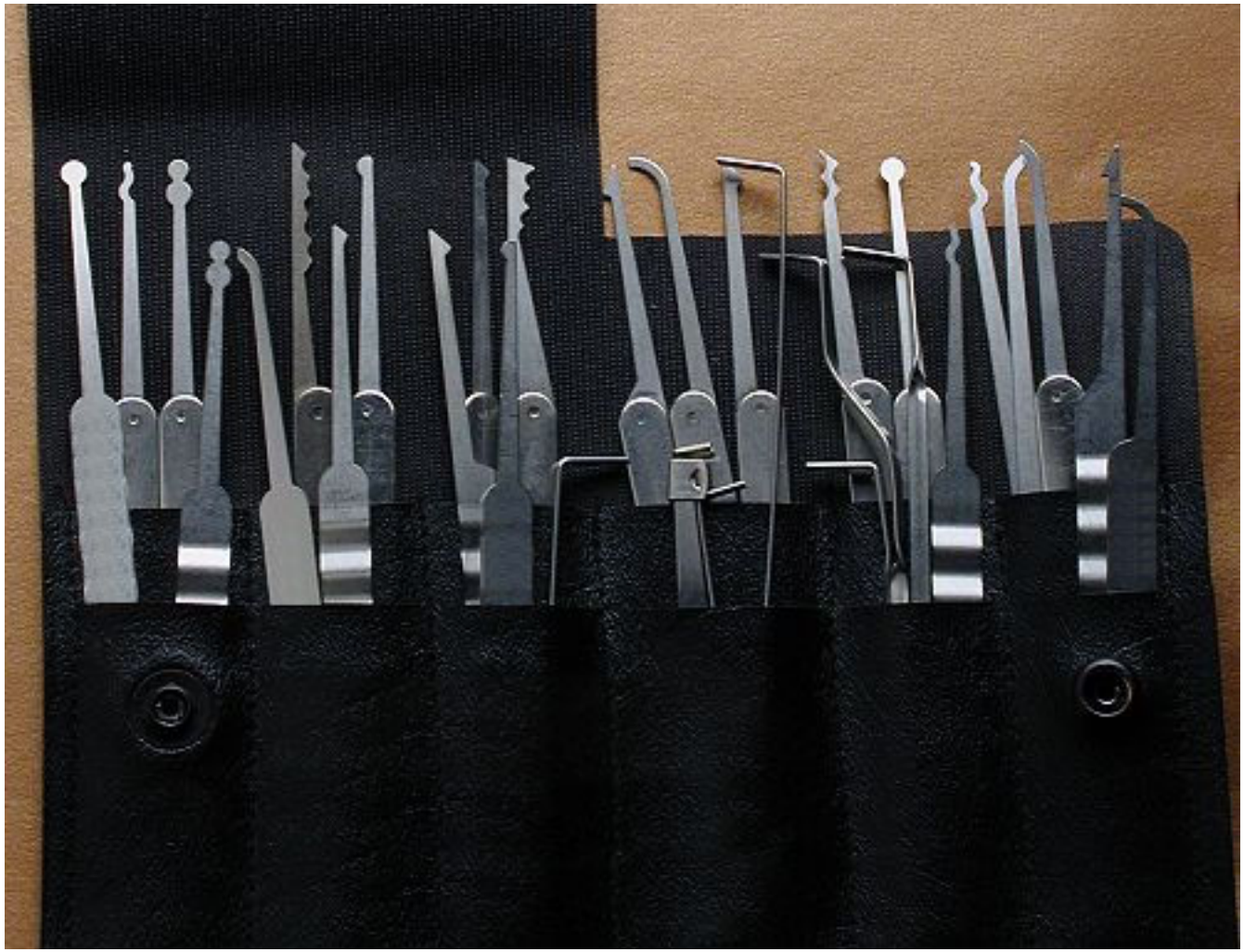
There are many lockpick vendors…



There are many lockpick vendors…



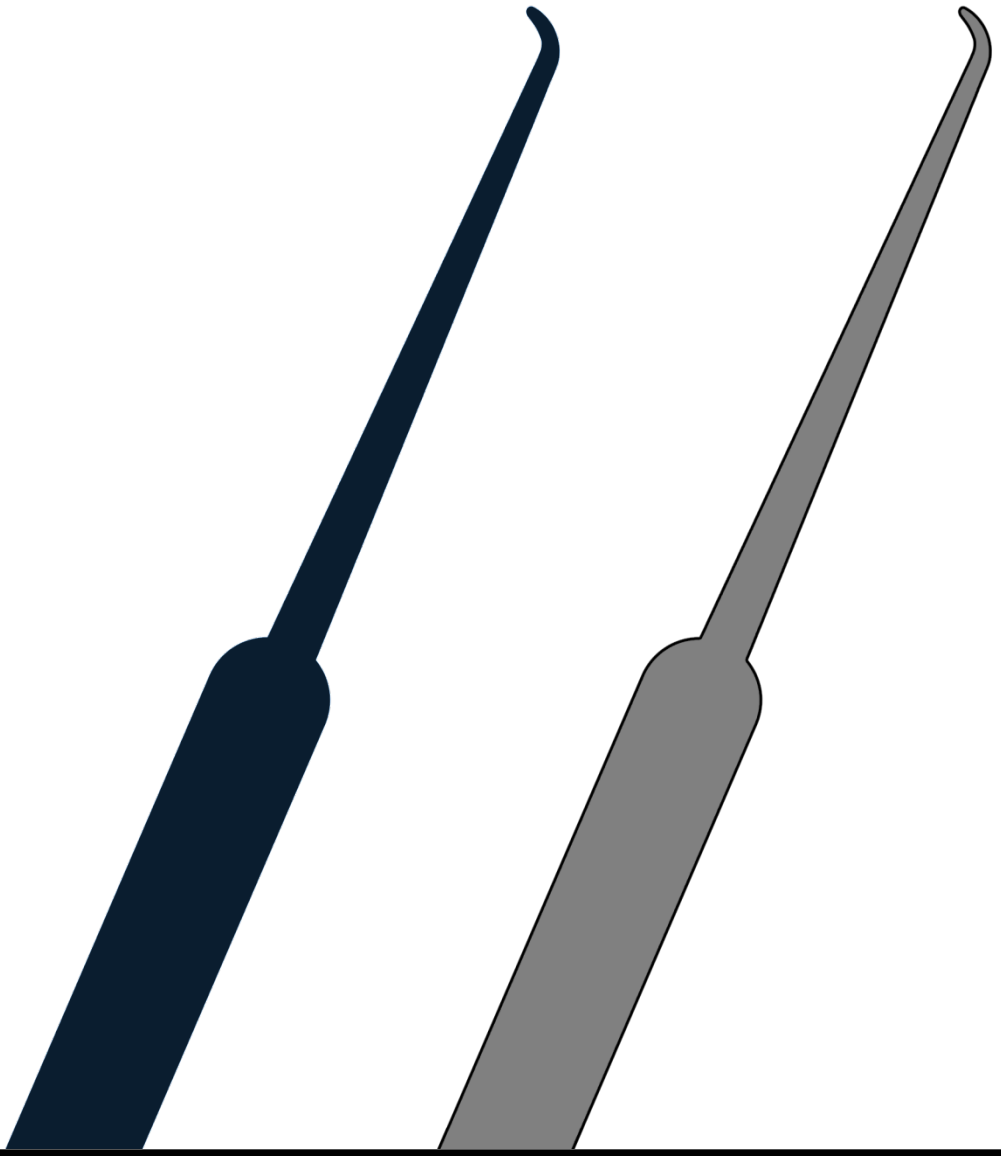
Selling many lockpicking tools



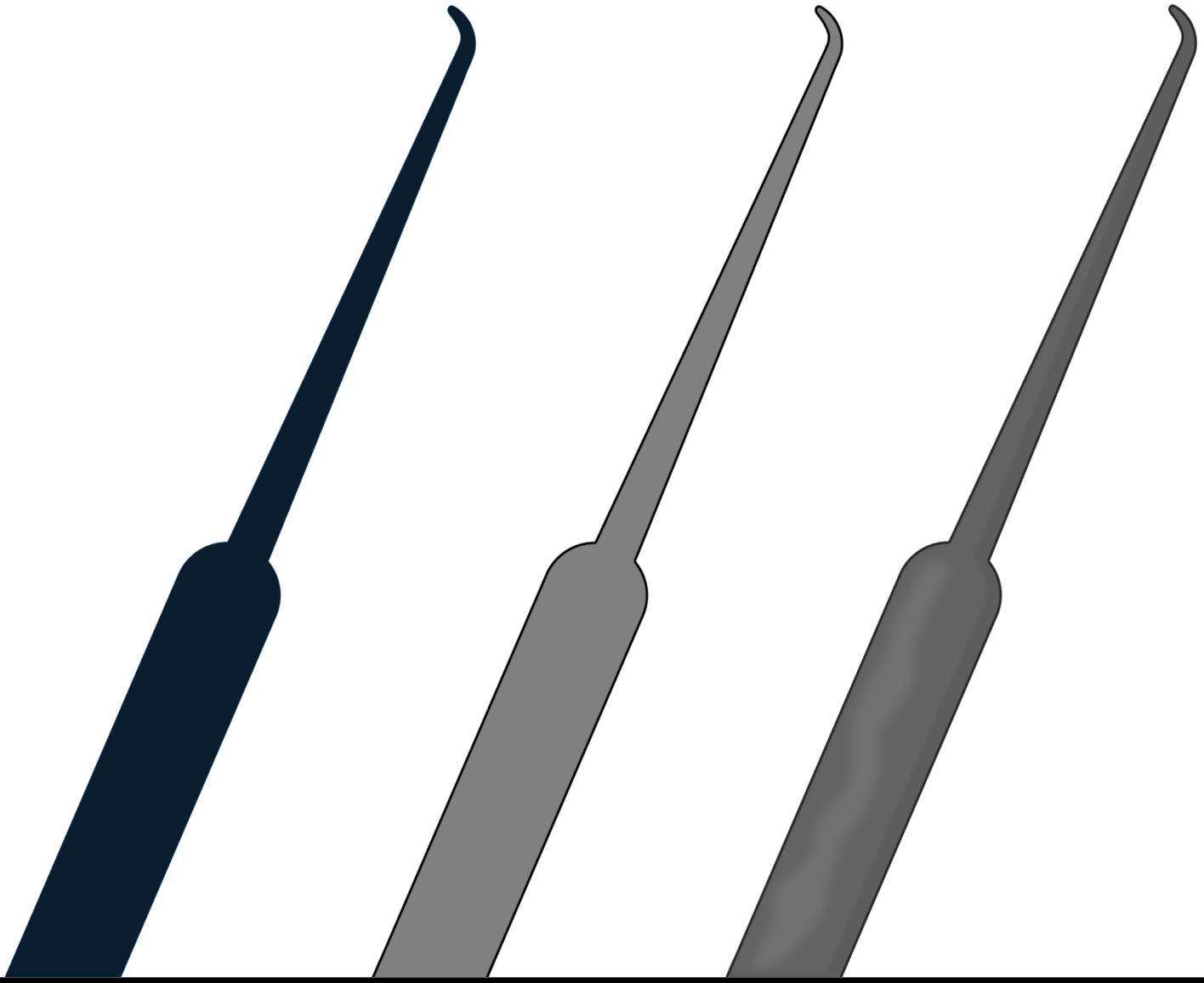
First, let's talk about metal…

Spring Steel

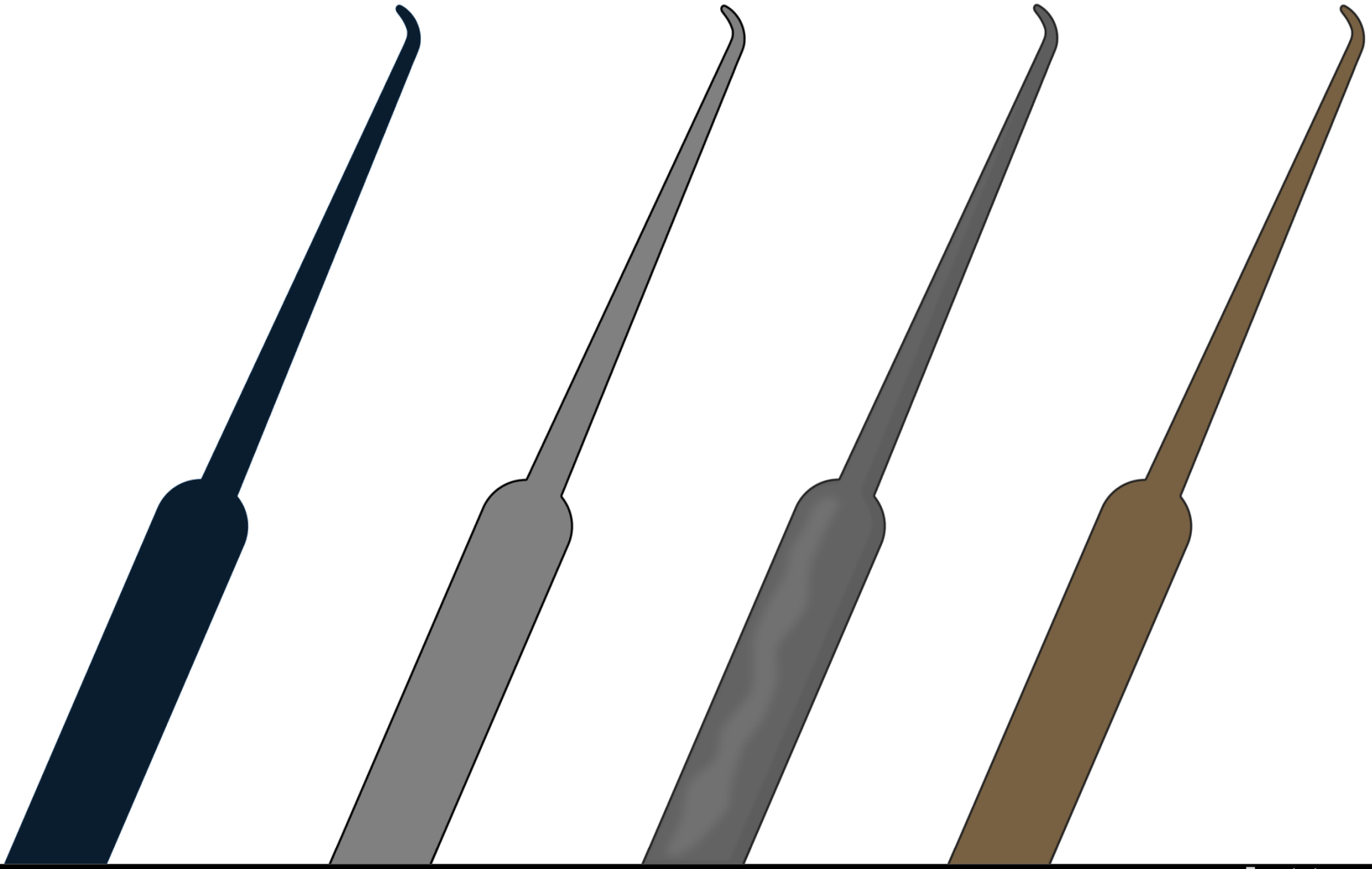
Stainless Steel



Titanium



Other Metals?



Thickness

0.015″ – Peterson "Government Steel"

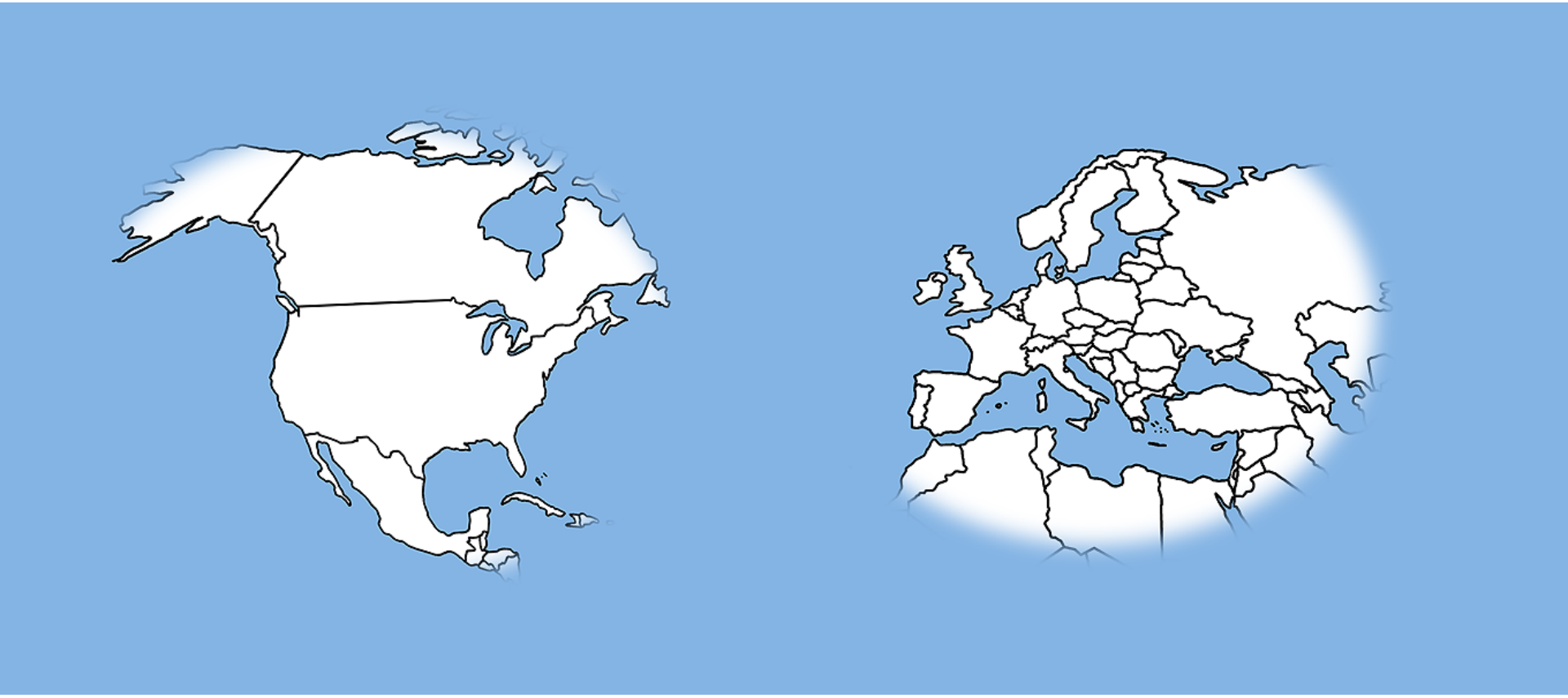
0.020″ – SouthOrd, Rytan, Southern Specialties, TOOOL

0.022″ – HPC Stainless

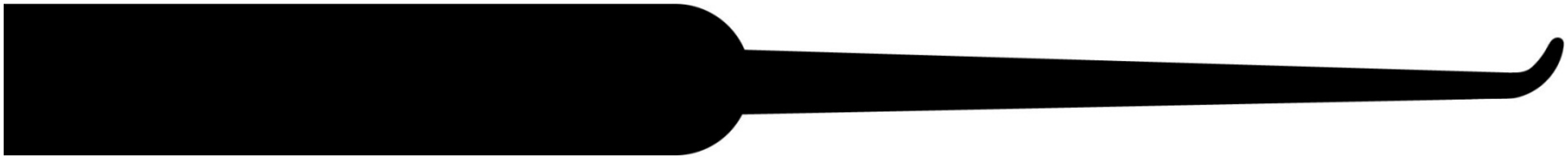
0.025″ – original TOOOL kits

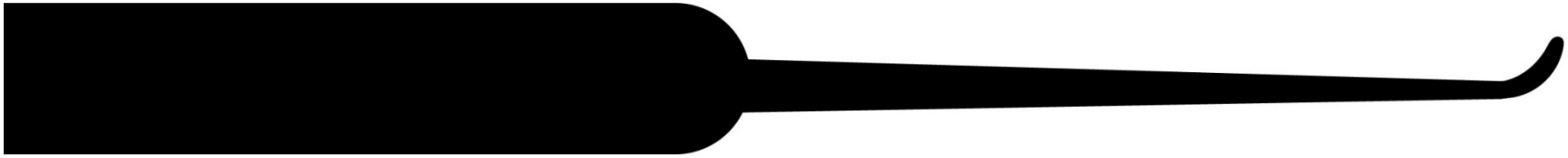
0.

“Standard” vs. “Euro”

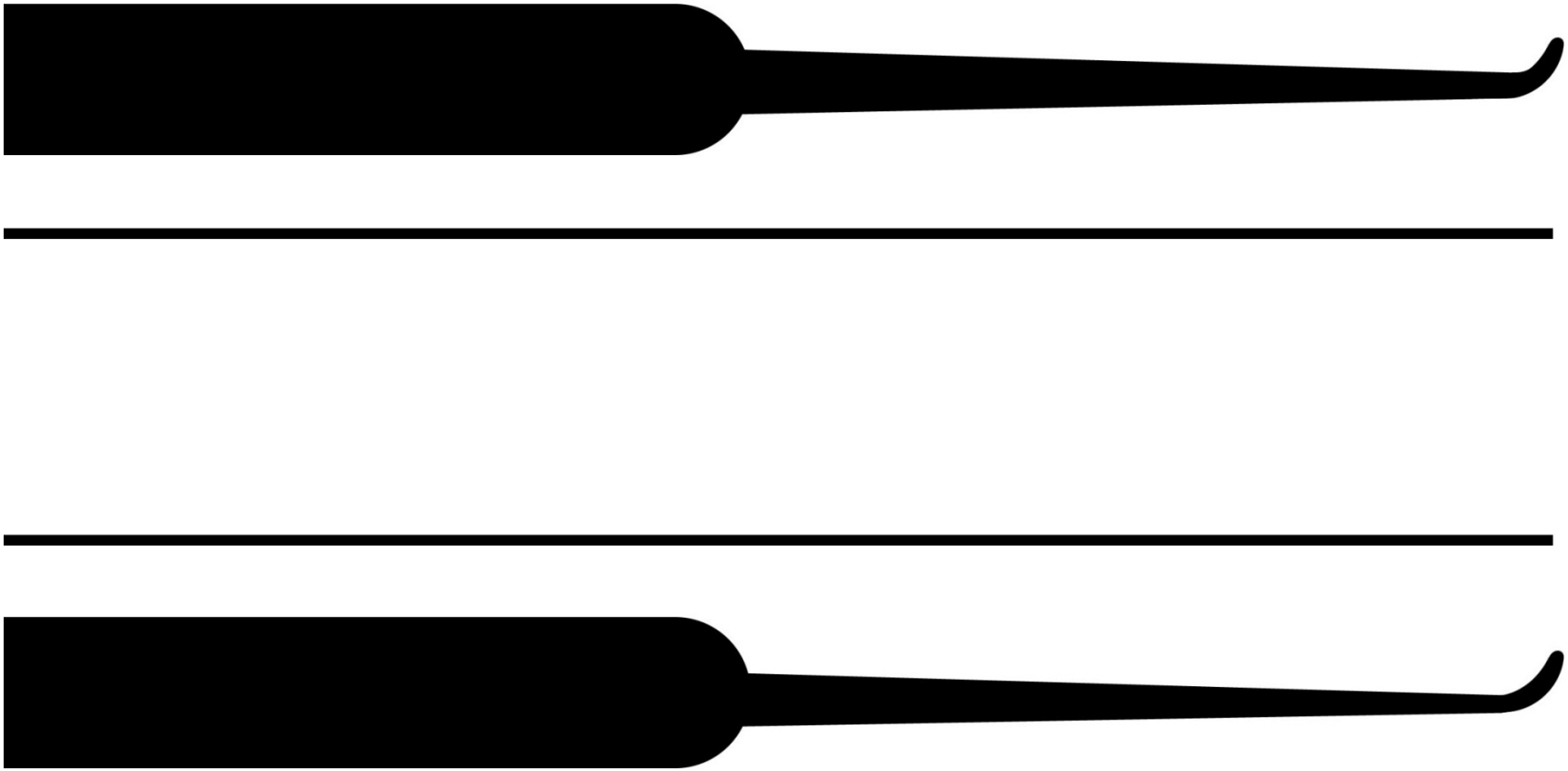


“Standard” vs. “Euro”

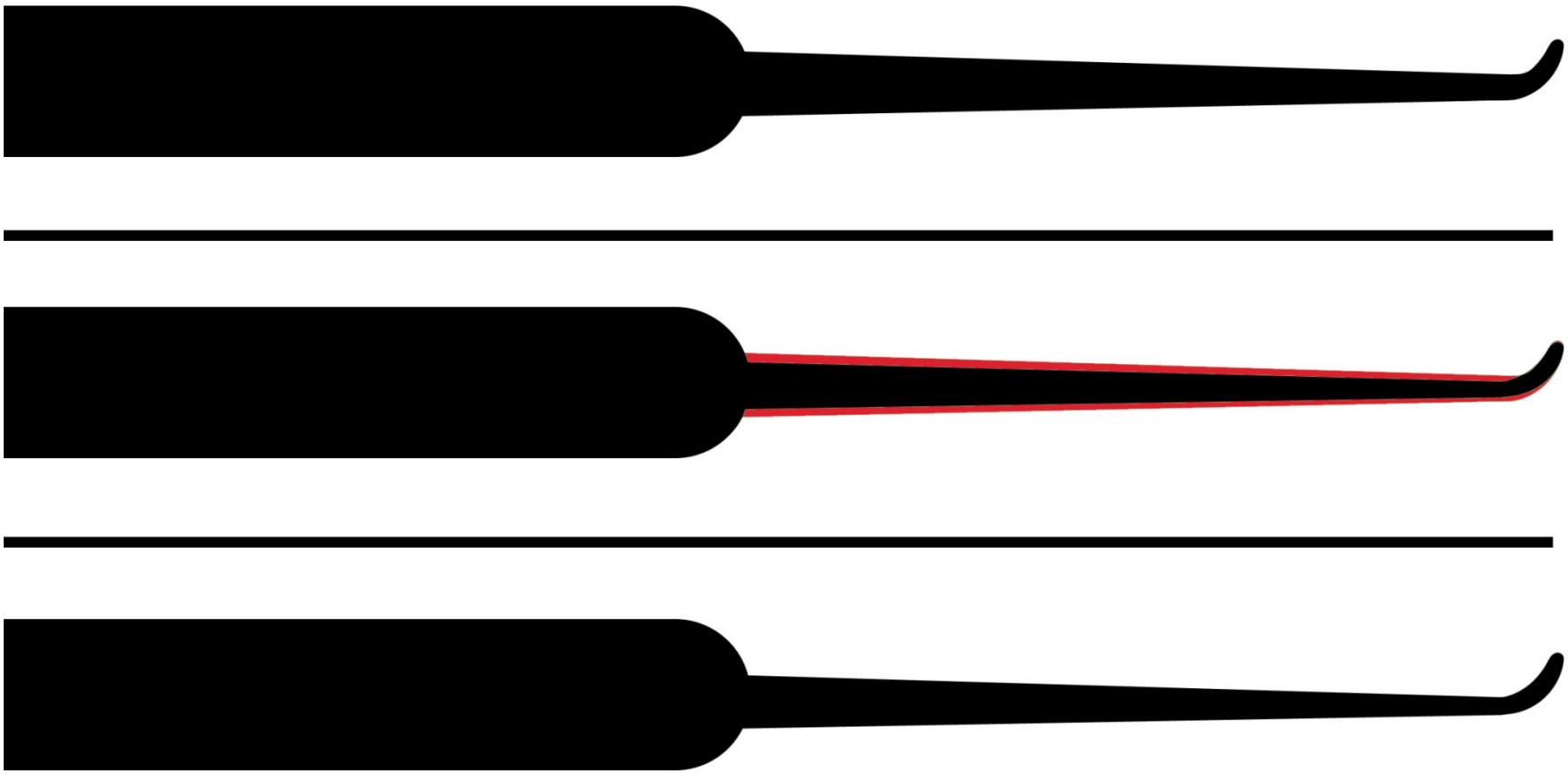




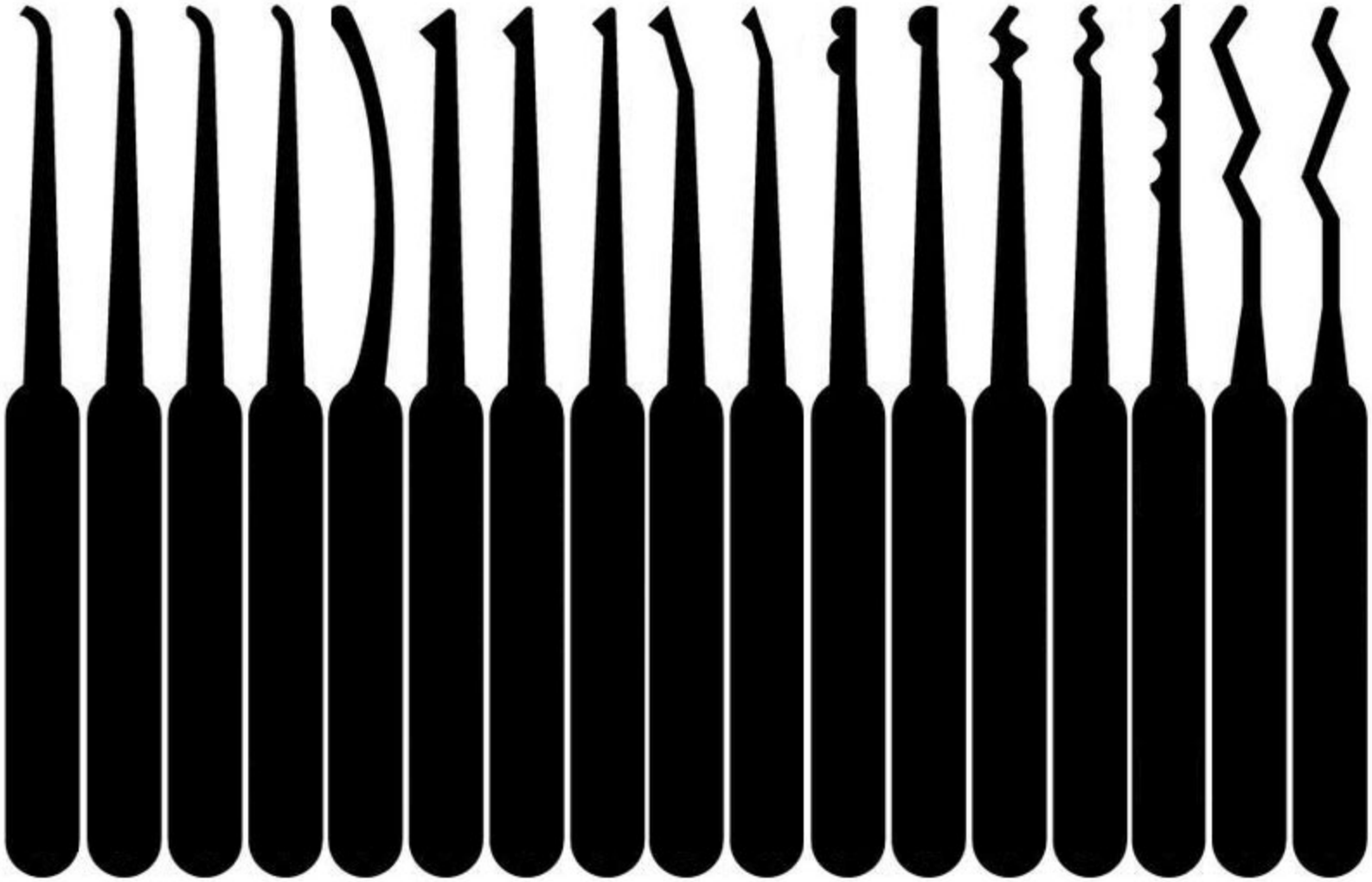
“Standard” vs. “Euro”



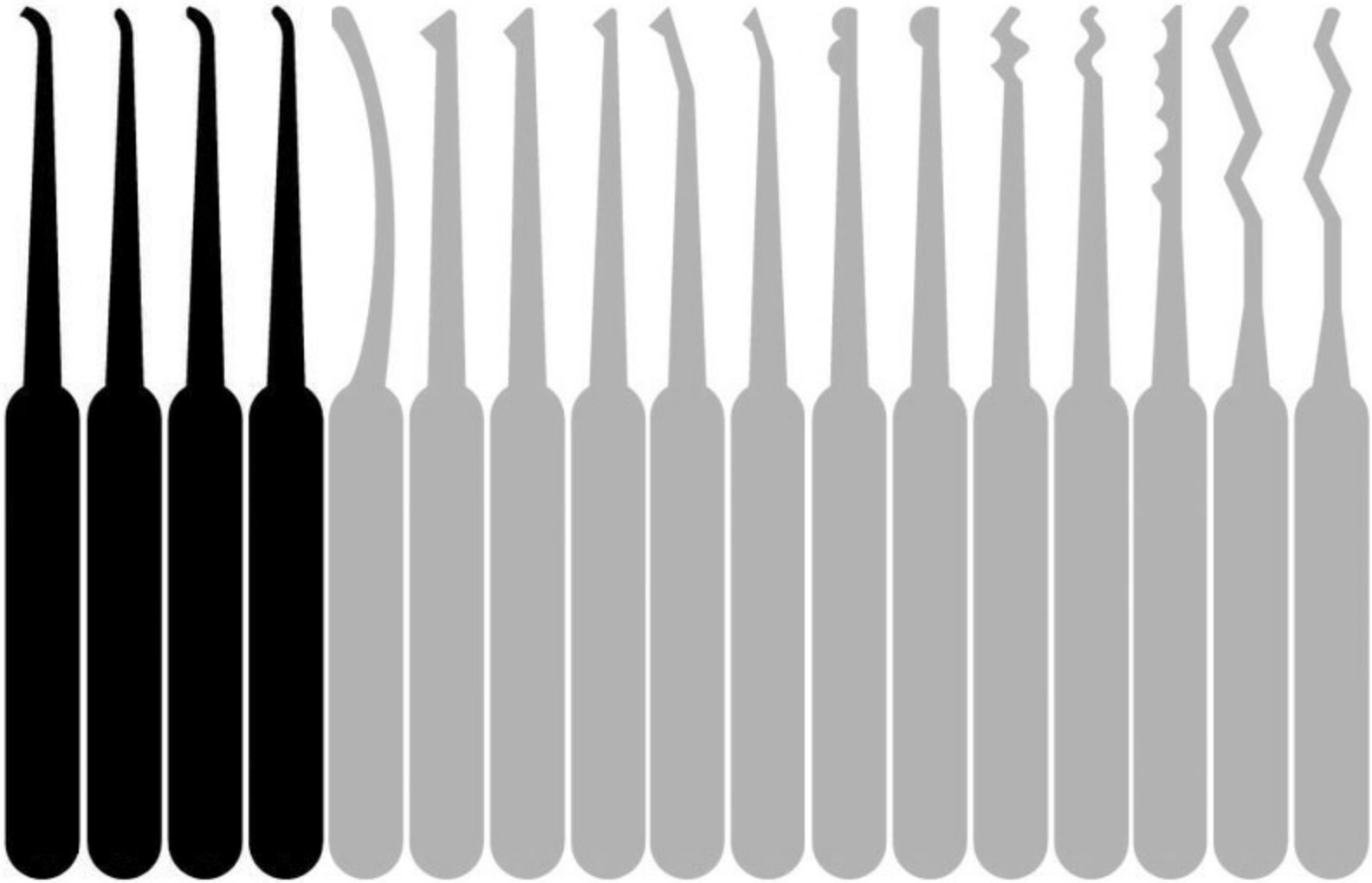
“Standard” vs. “Euro”



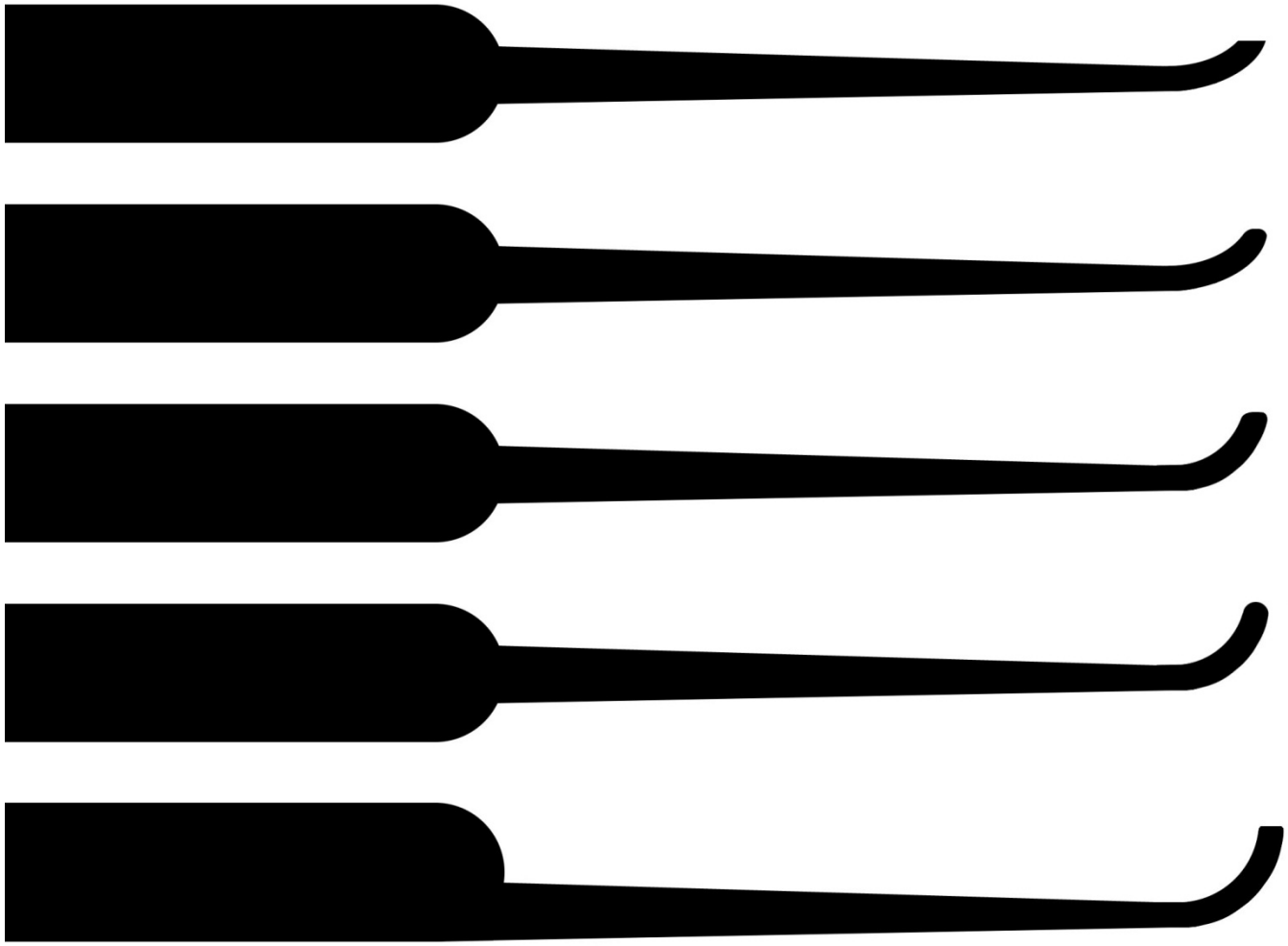
The *real* confusing mess… Categories & Names



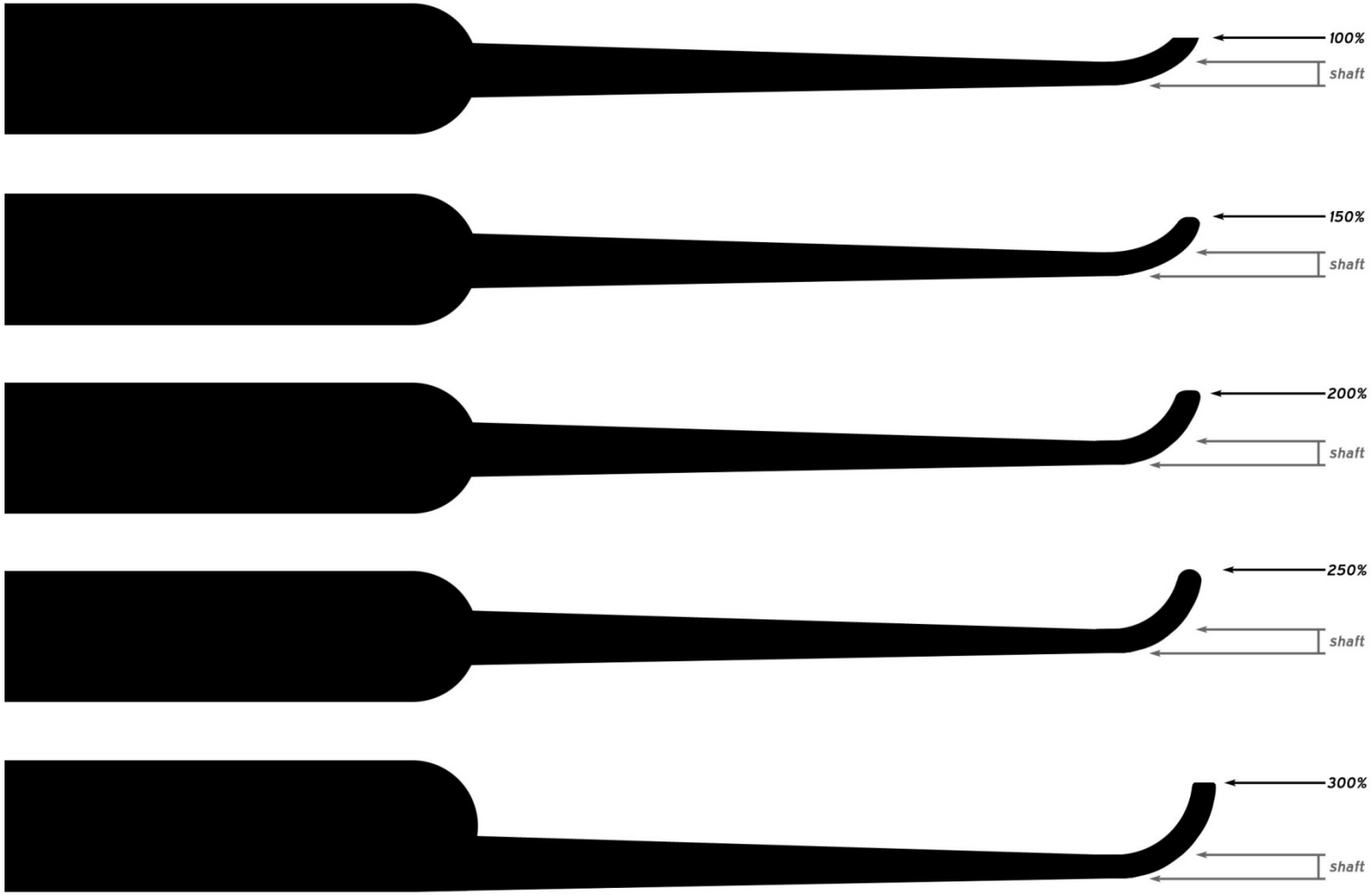
What would you call these?



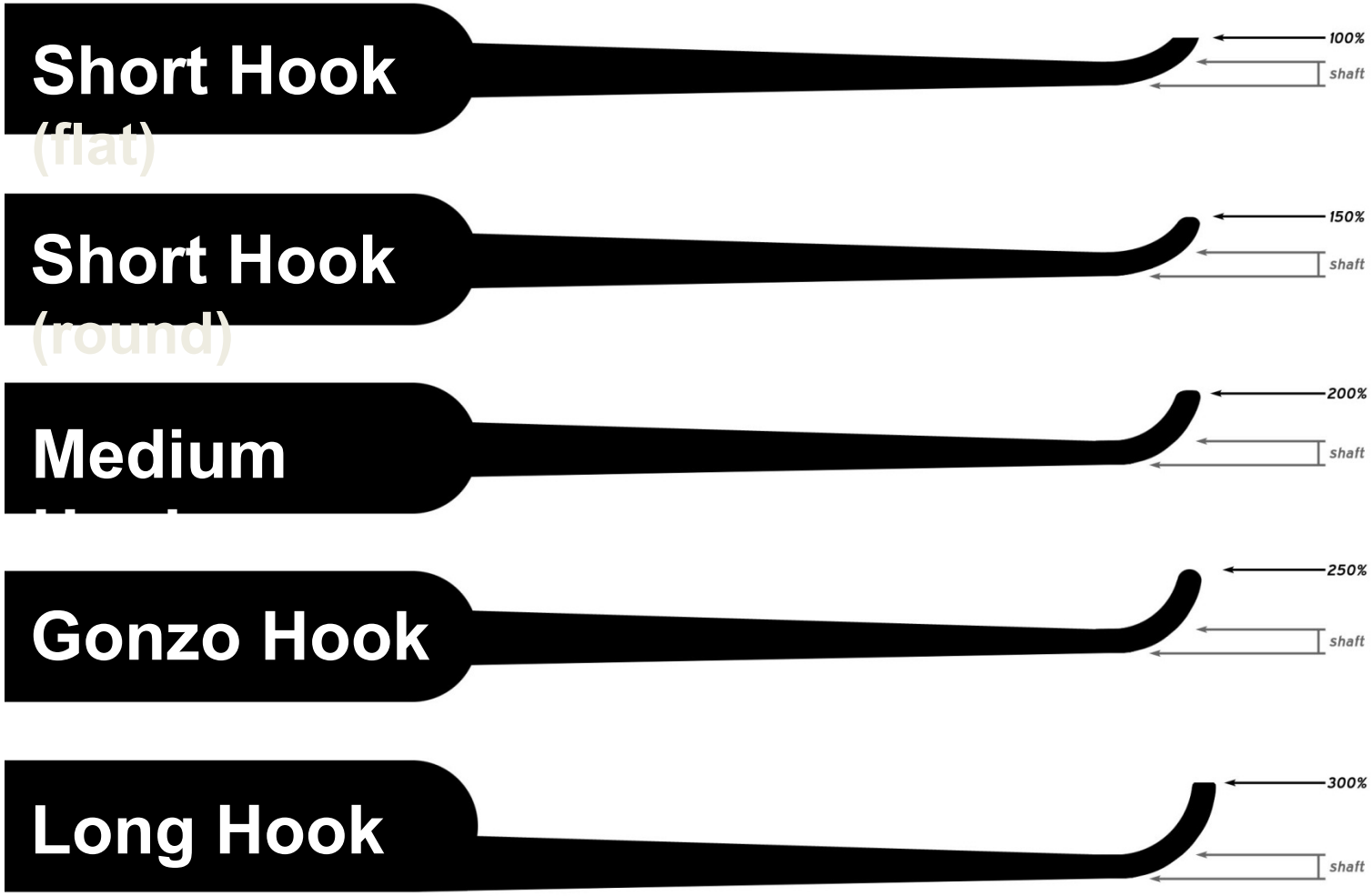
Hooks (a.k.a. Lifters)



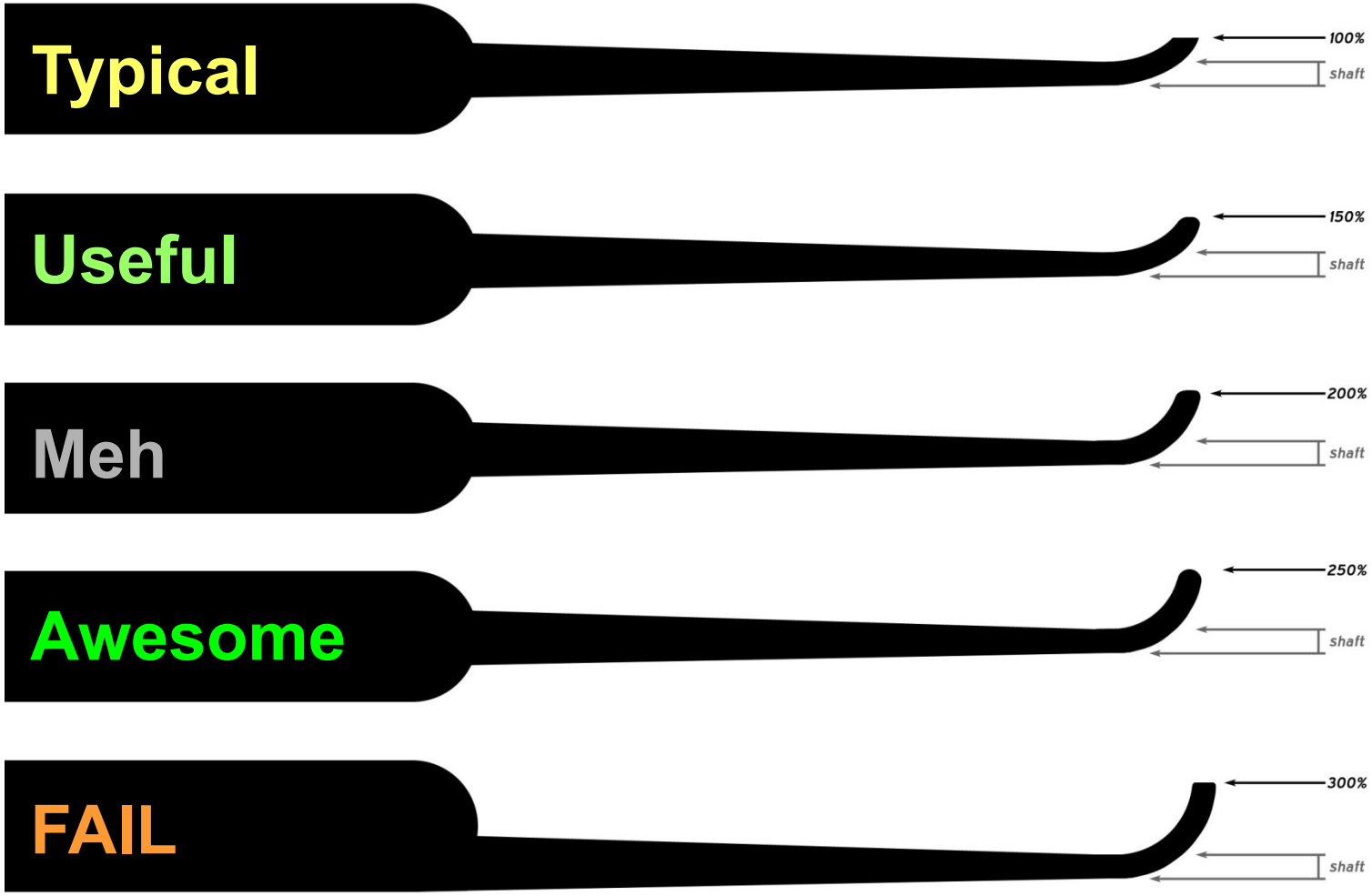
Hooks (a.k.a. Lifters)



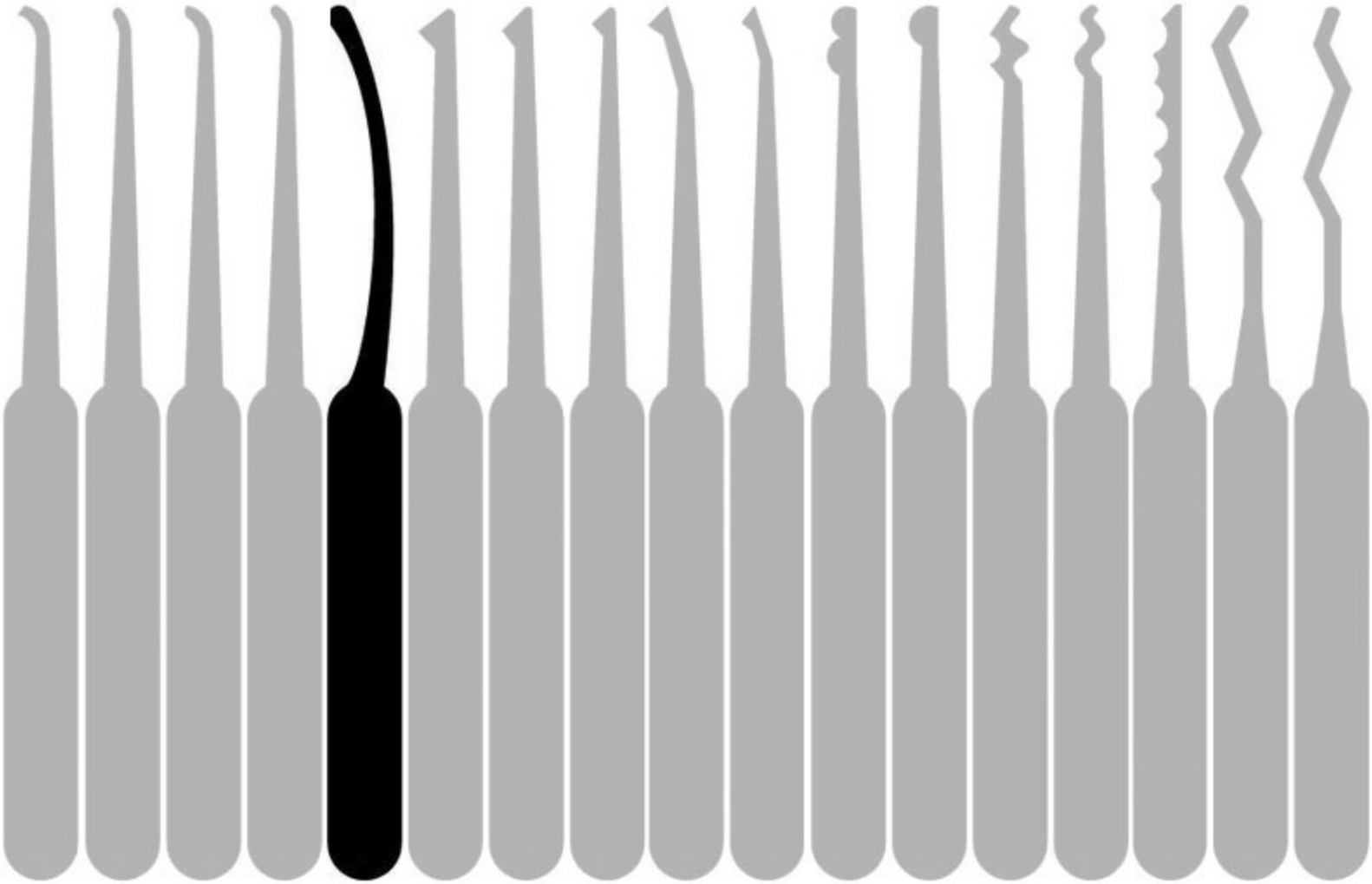
Hooks (a.k.a. Lifters)



Hooks (a.k.a. Lifters)

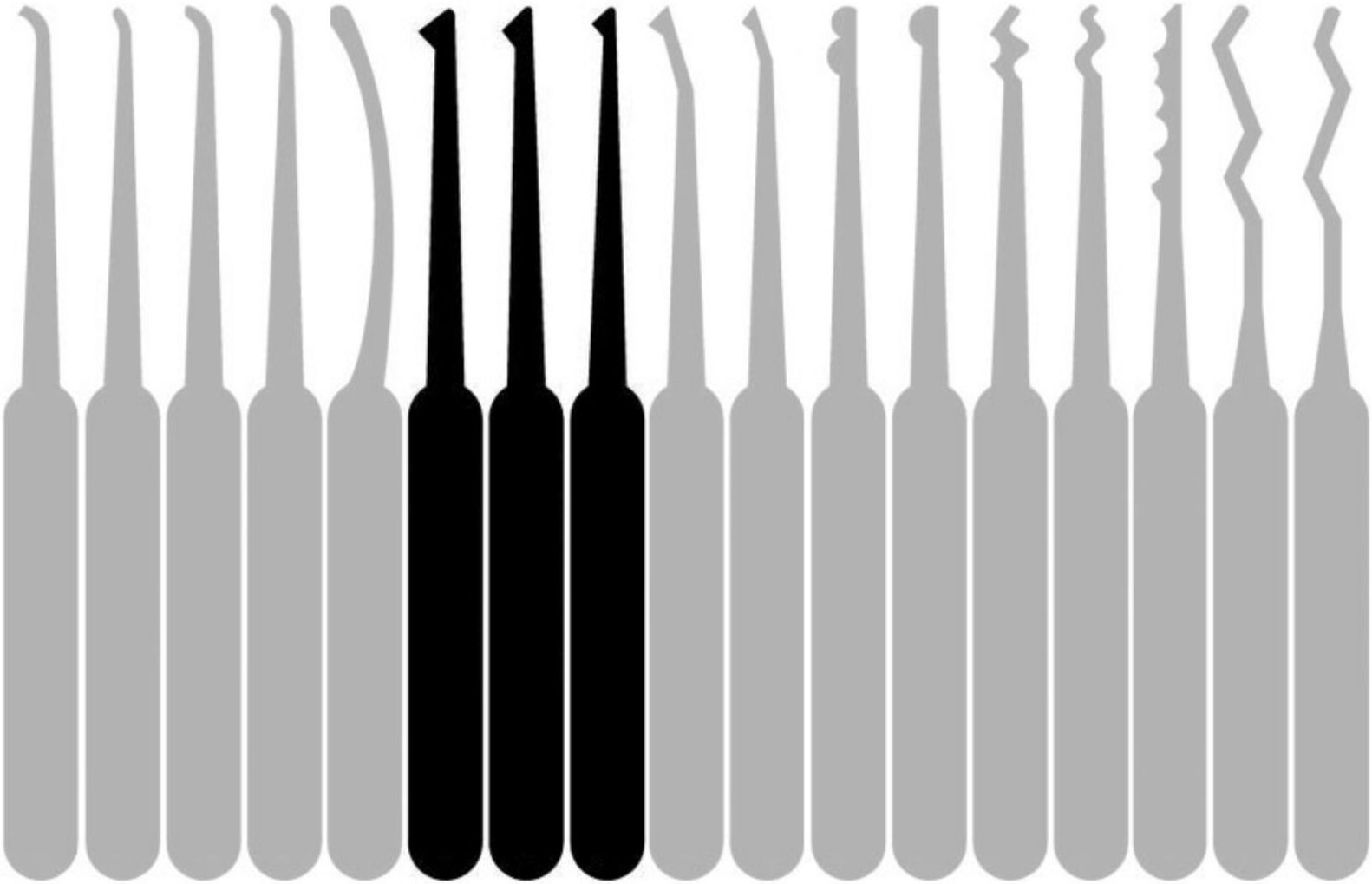


What would you call these?

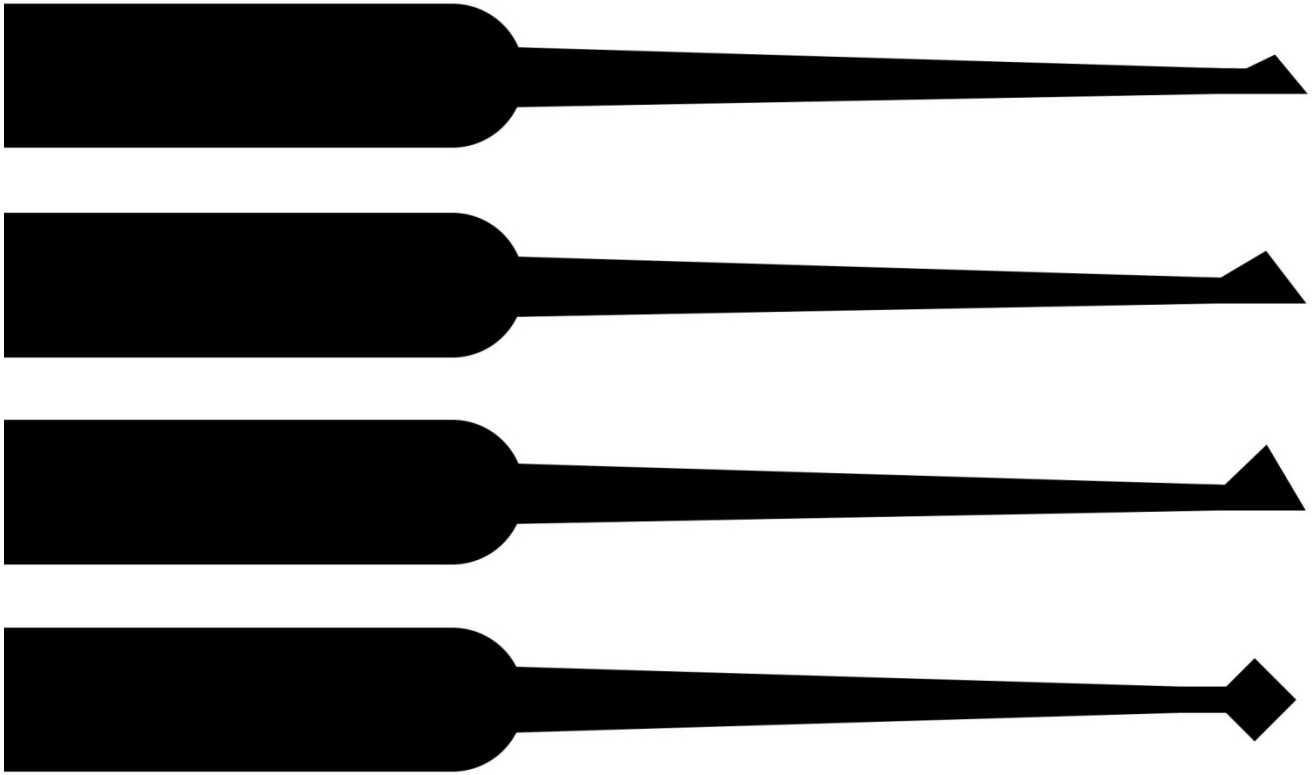


Reach Tools

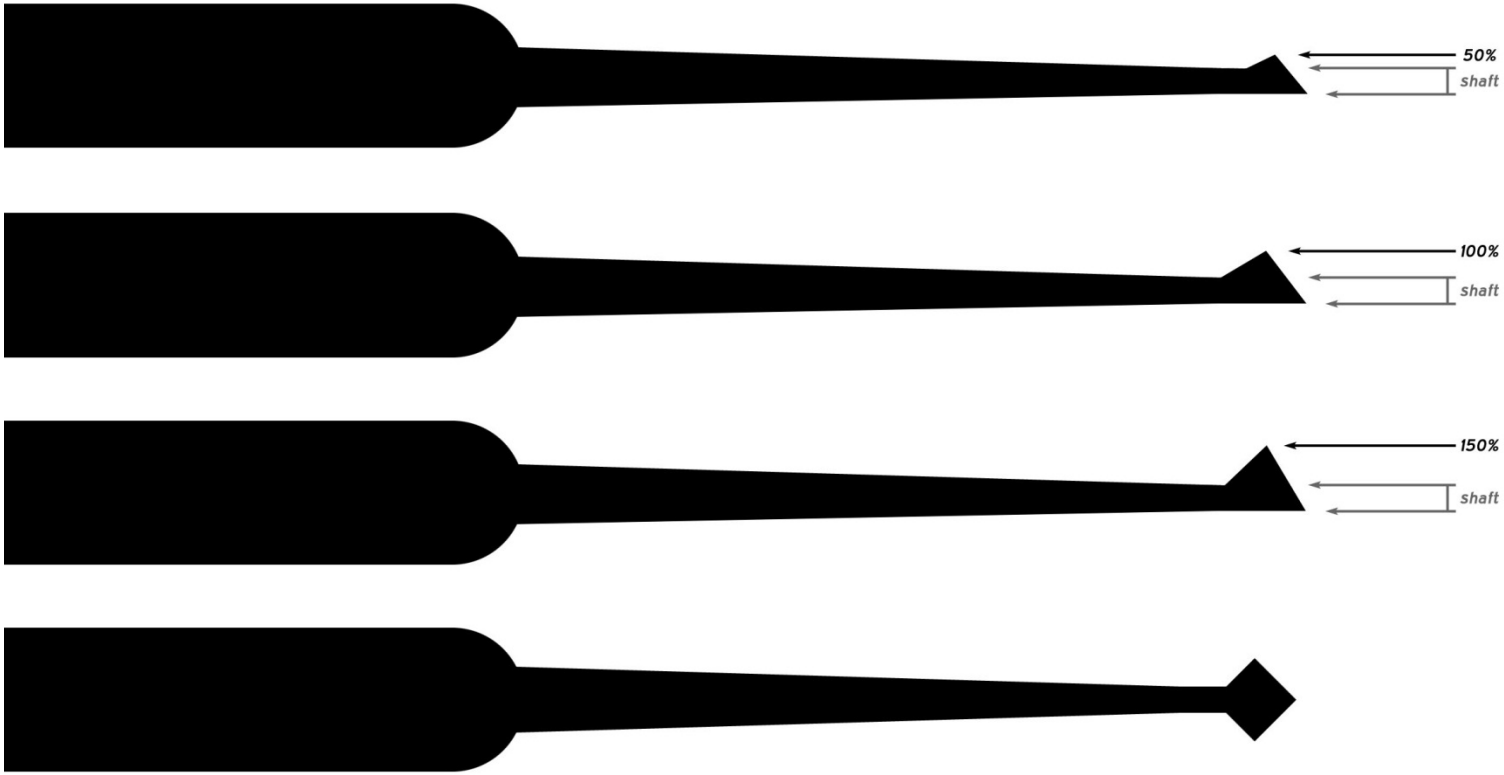
You've all seen these…



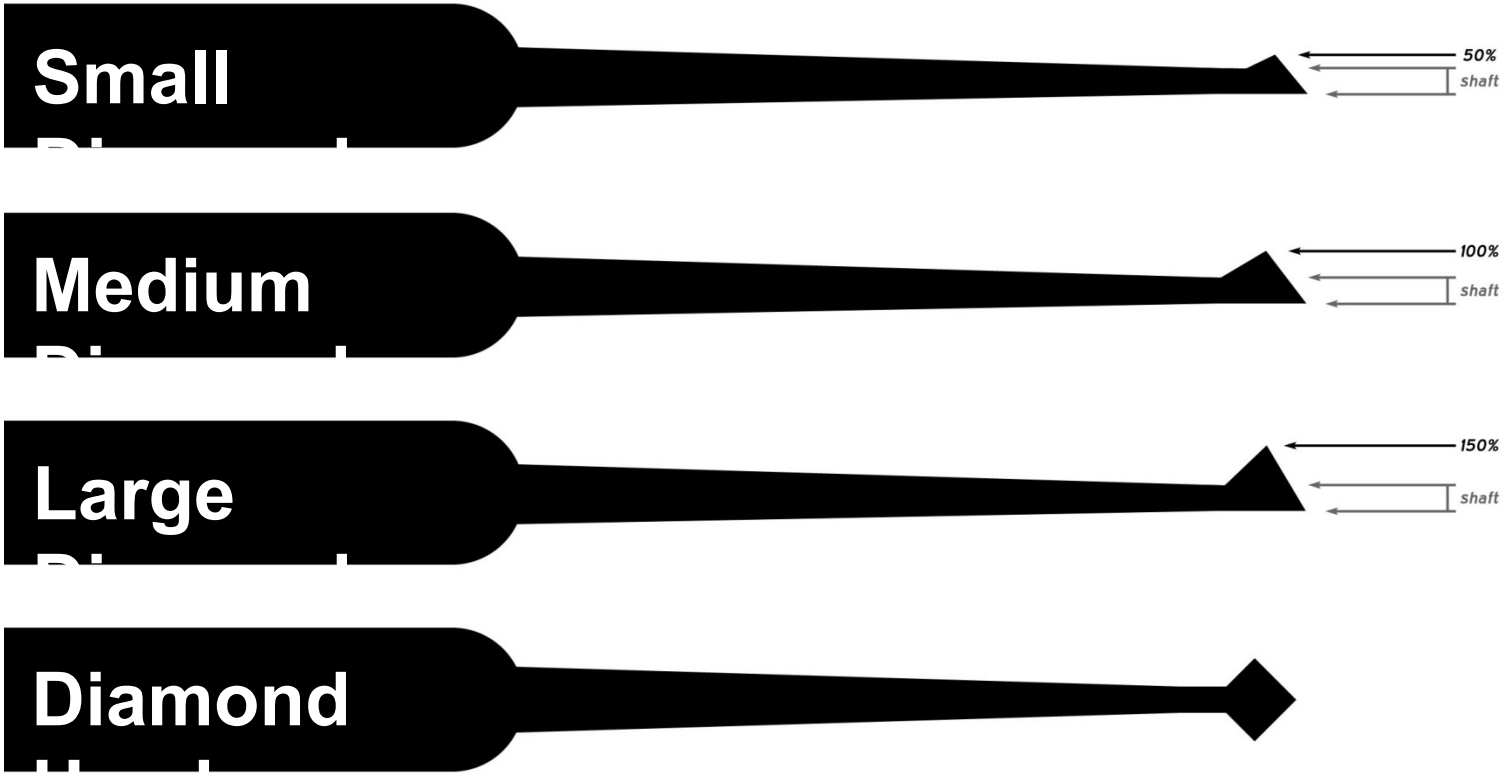
Diamonds



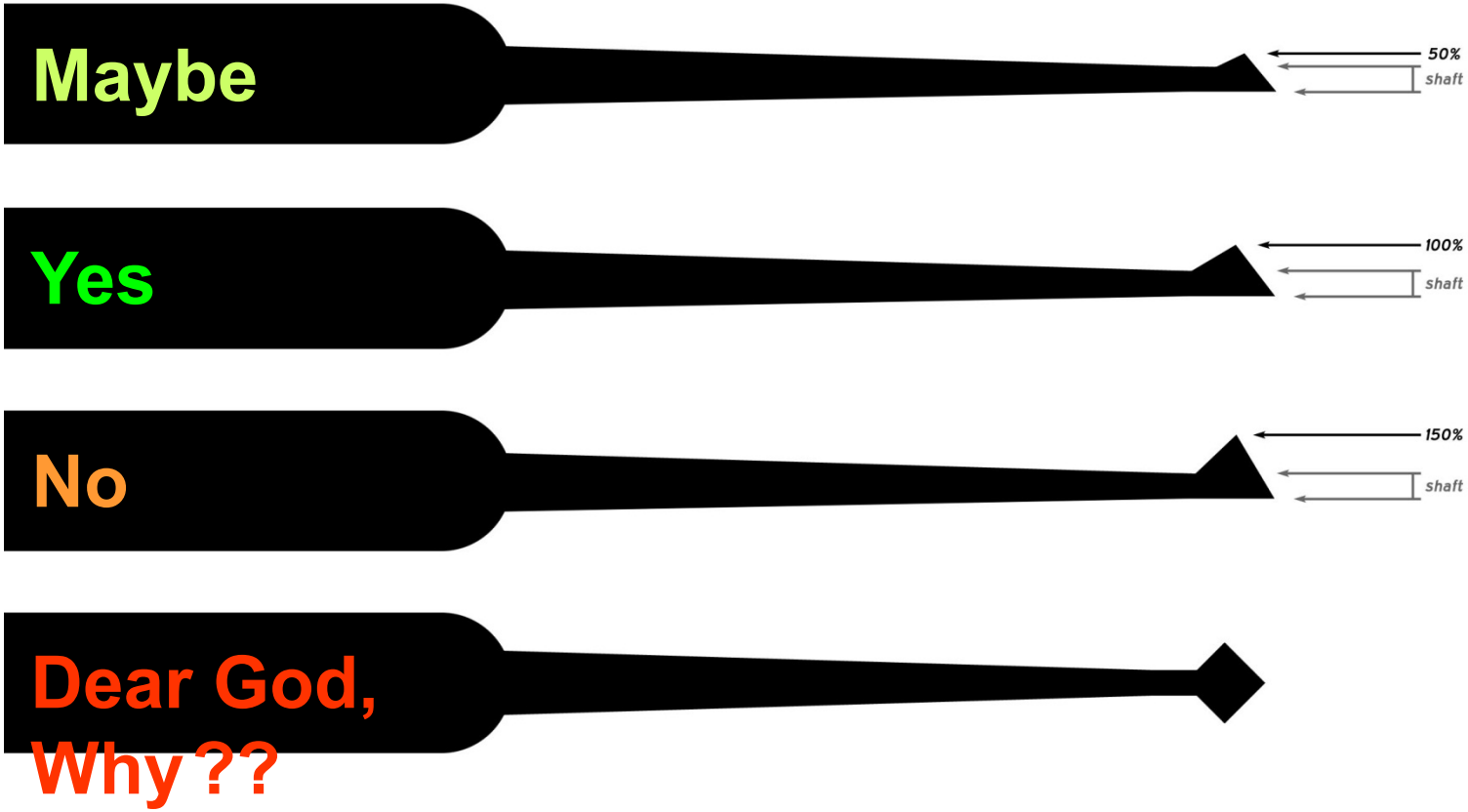
Diamonds



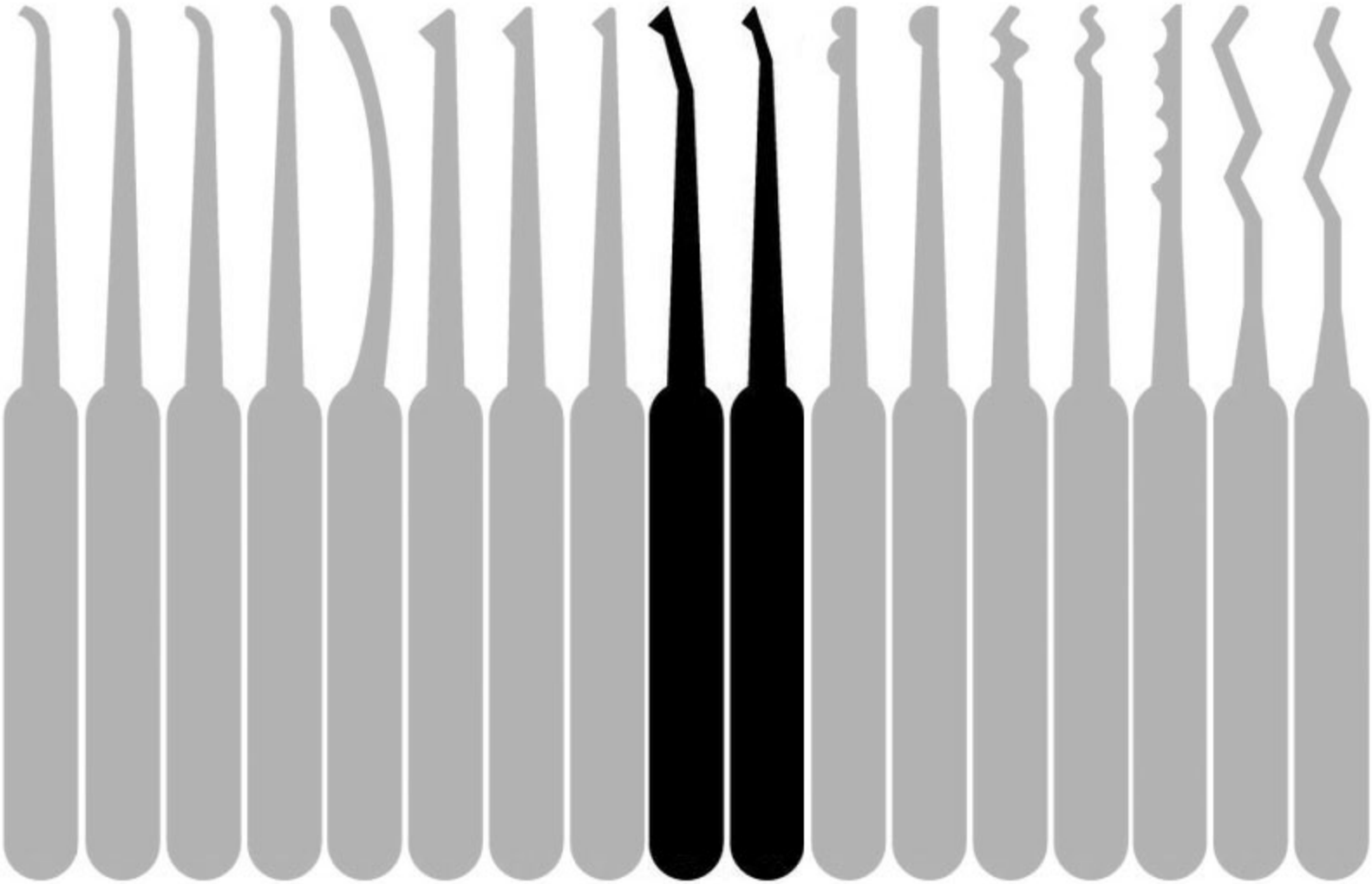
Diamonds



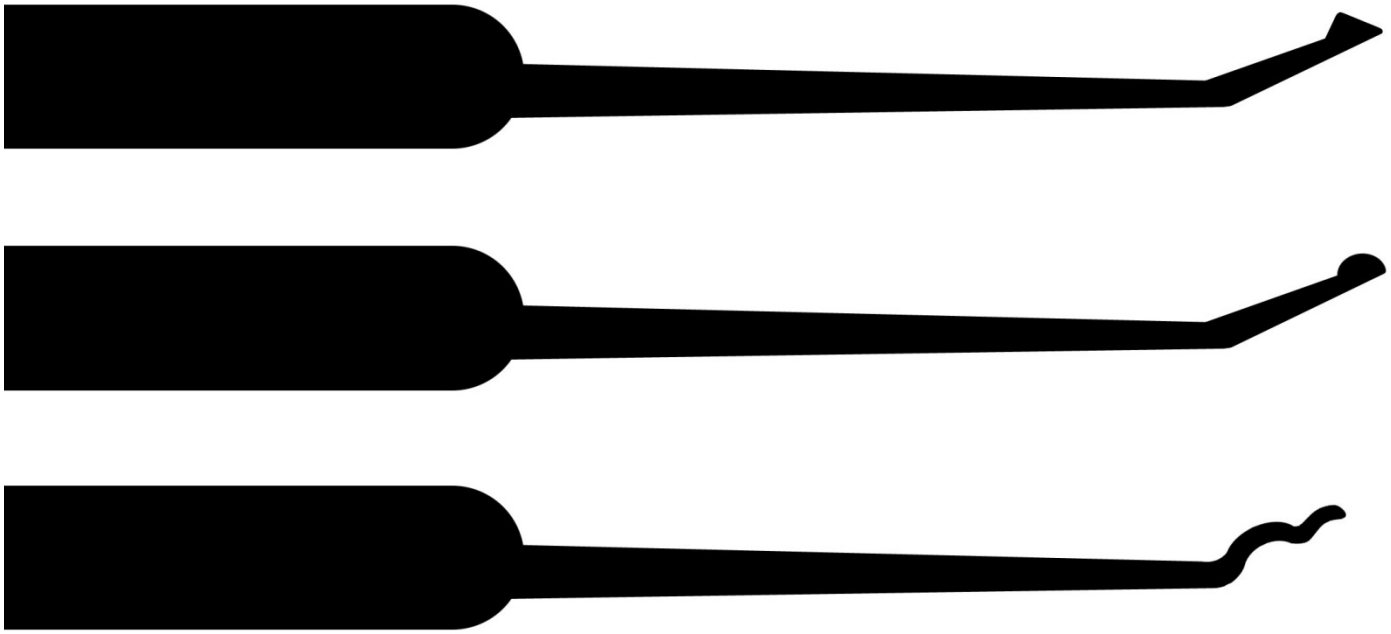
Diamonds



How would you categorize *these*…?



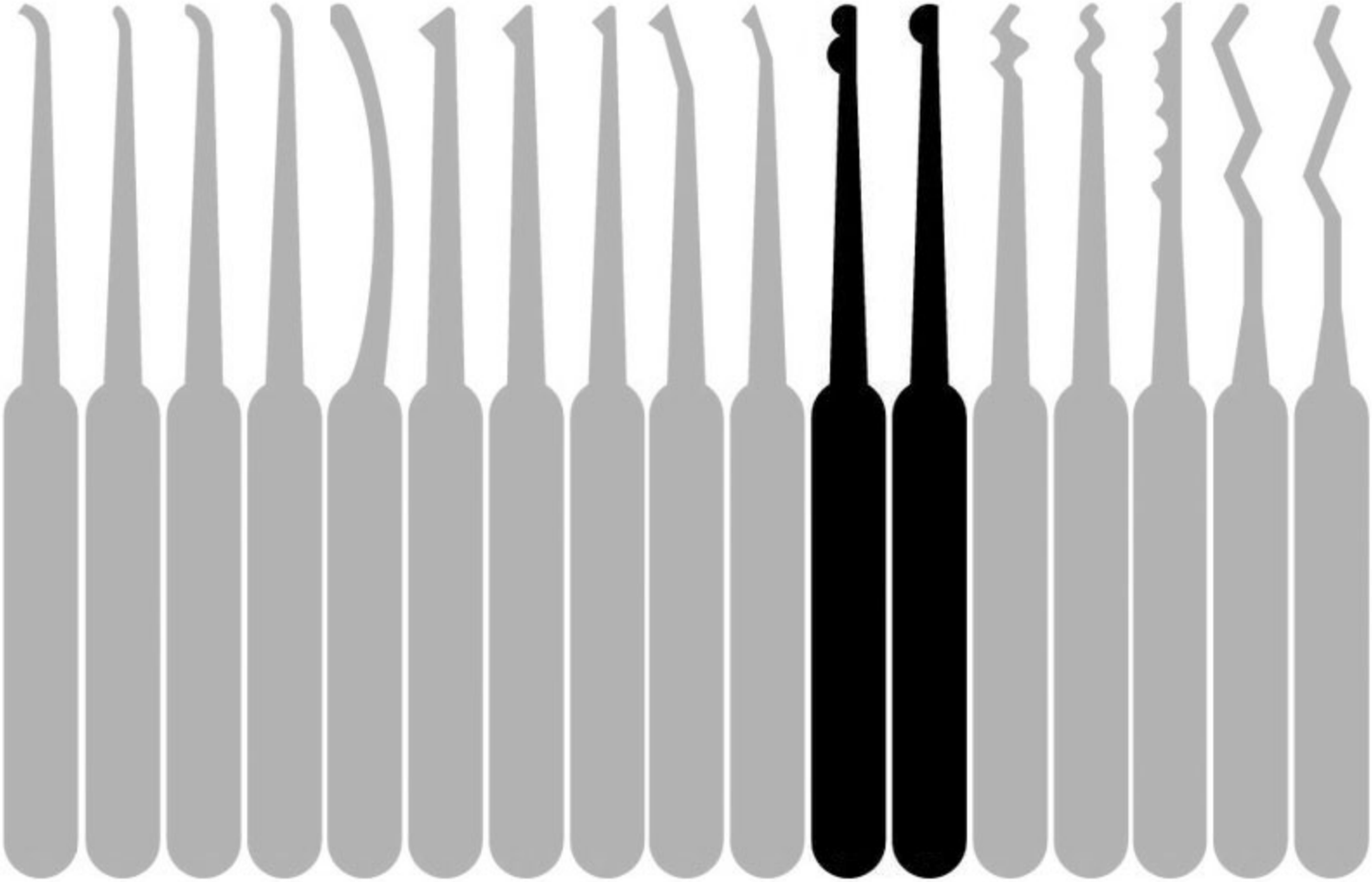
Offset Tools



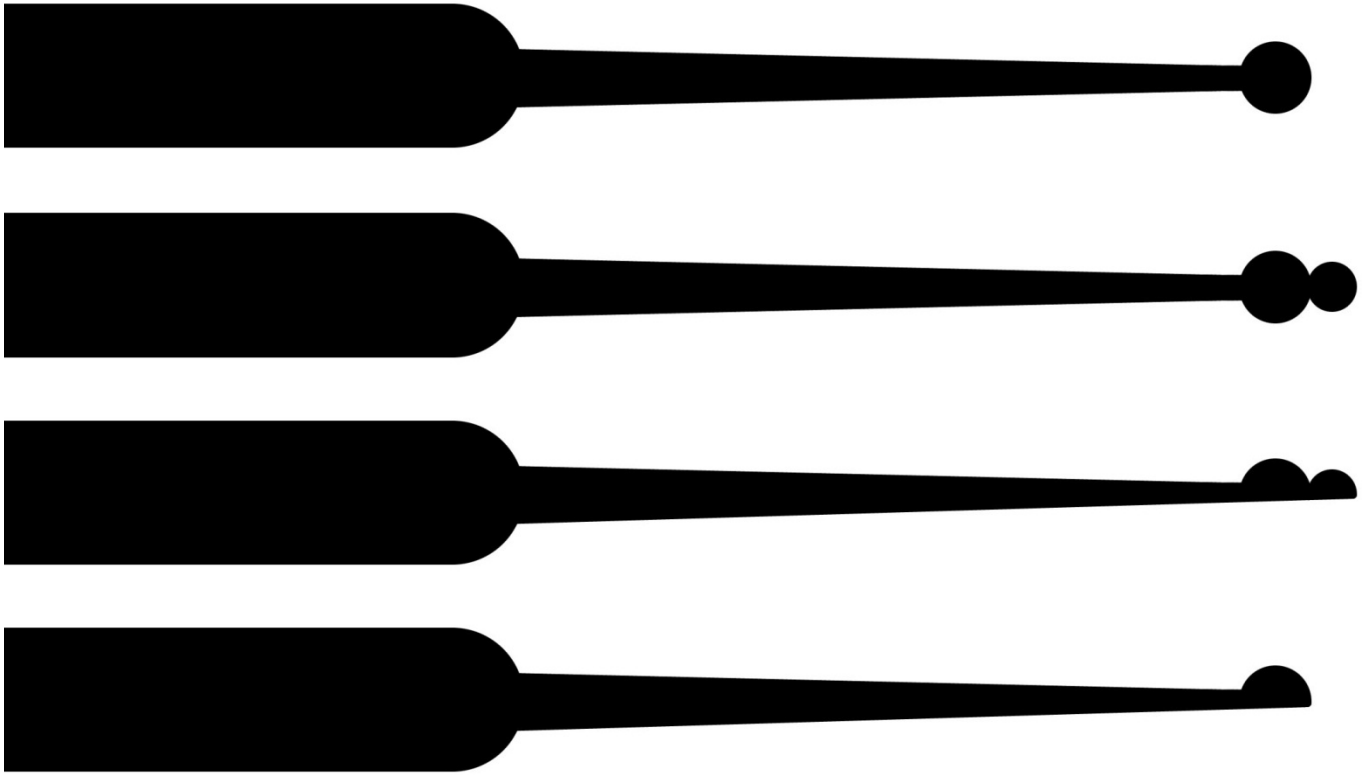
Offset Tools

Offset Tools

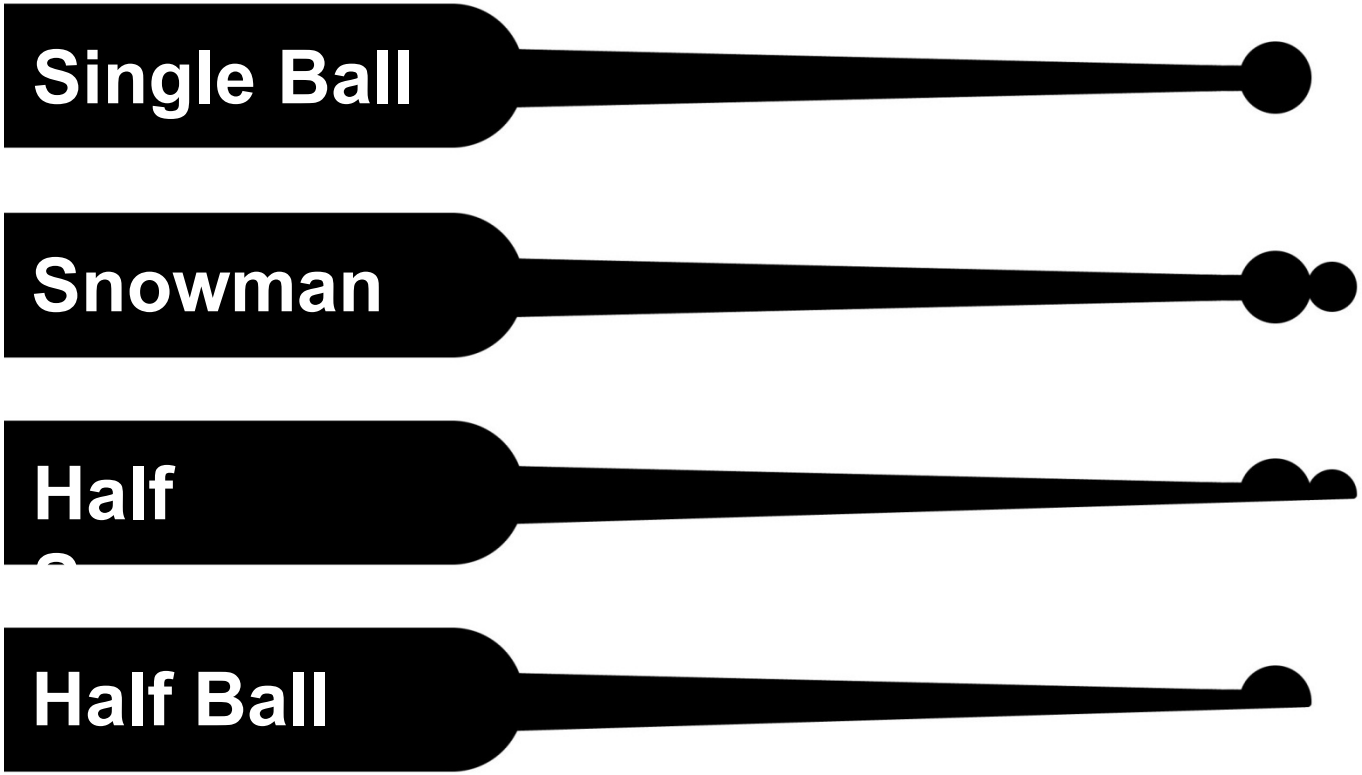
Balls, balls, balls…



Balls, balls, balls…

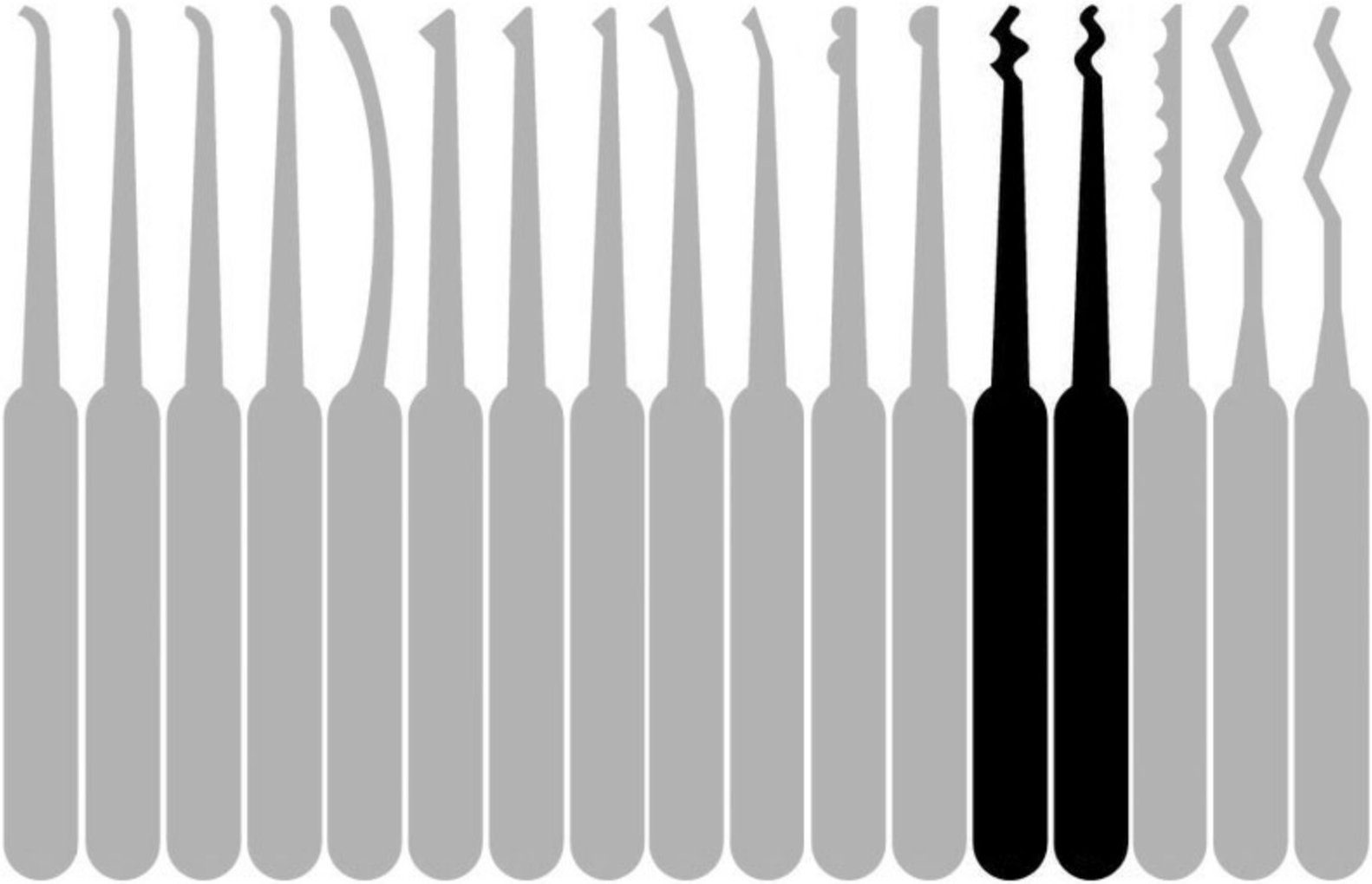


Balls, balls, balls…



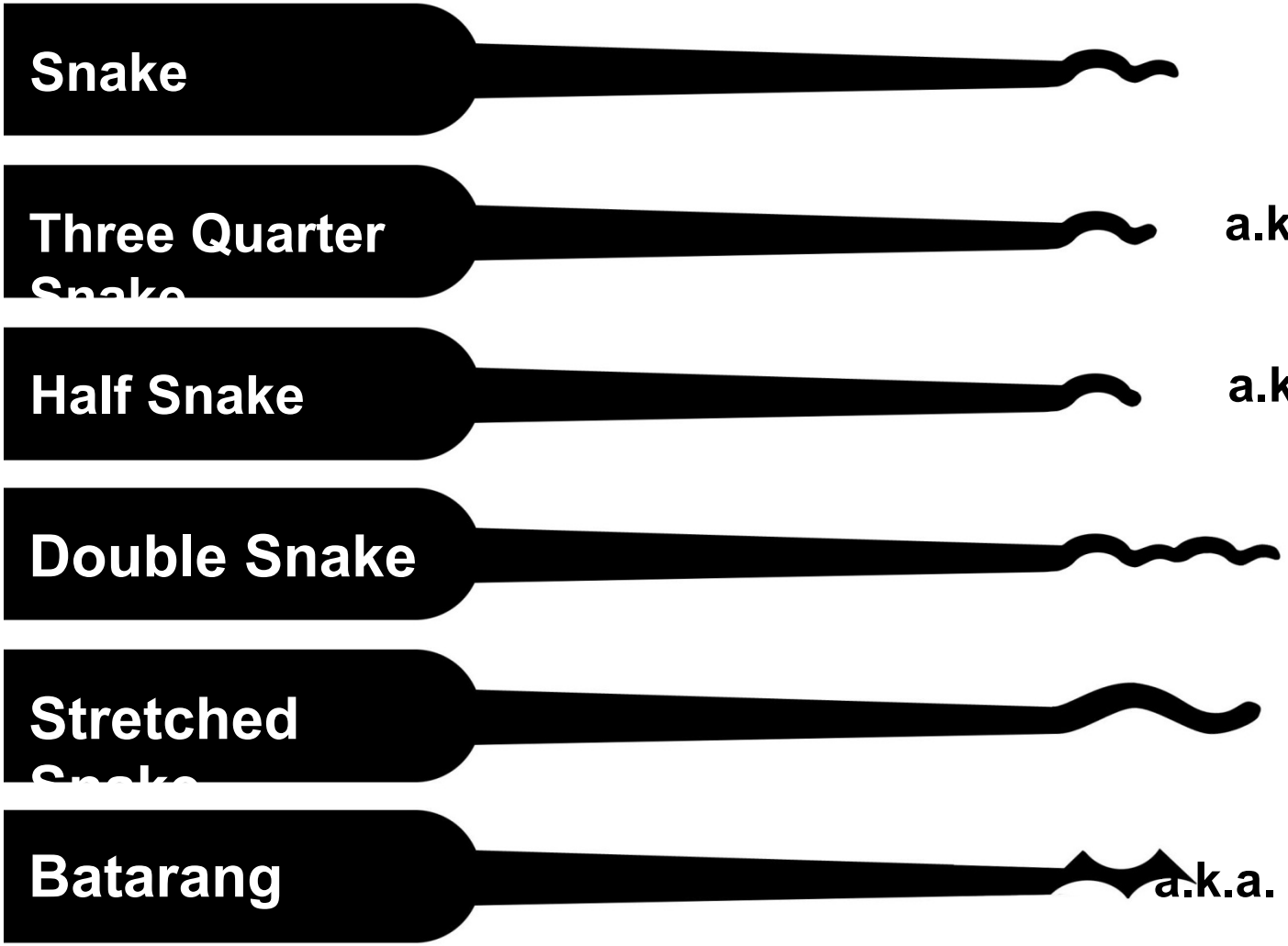
Balls, balls, balls…

What would you call these?



Raking tools… Welcome to Crazy Land

Raking Tools



a.k.a. C Rake, Double Rake

a.k.a. Rake-and-a-Half

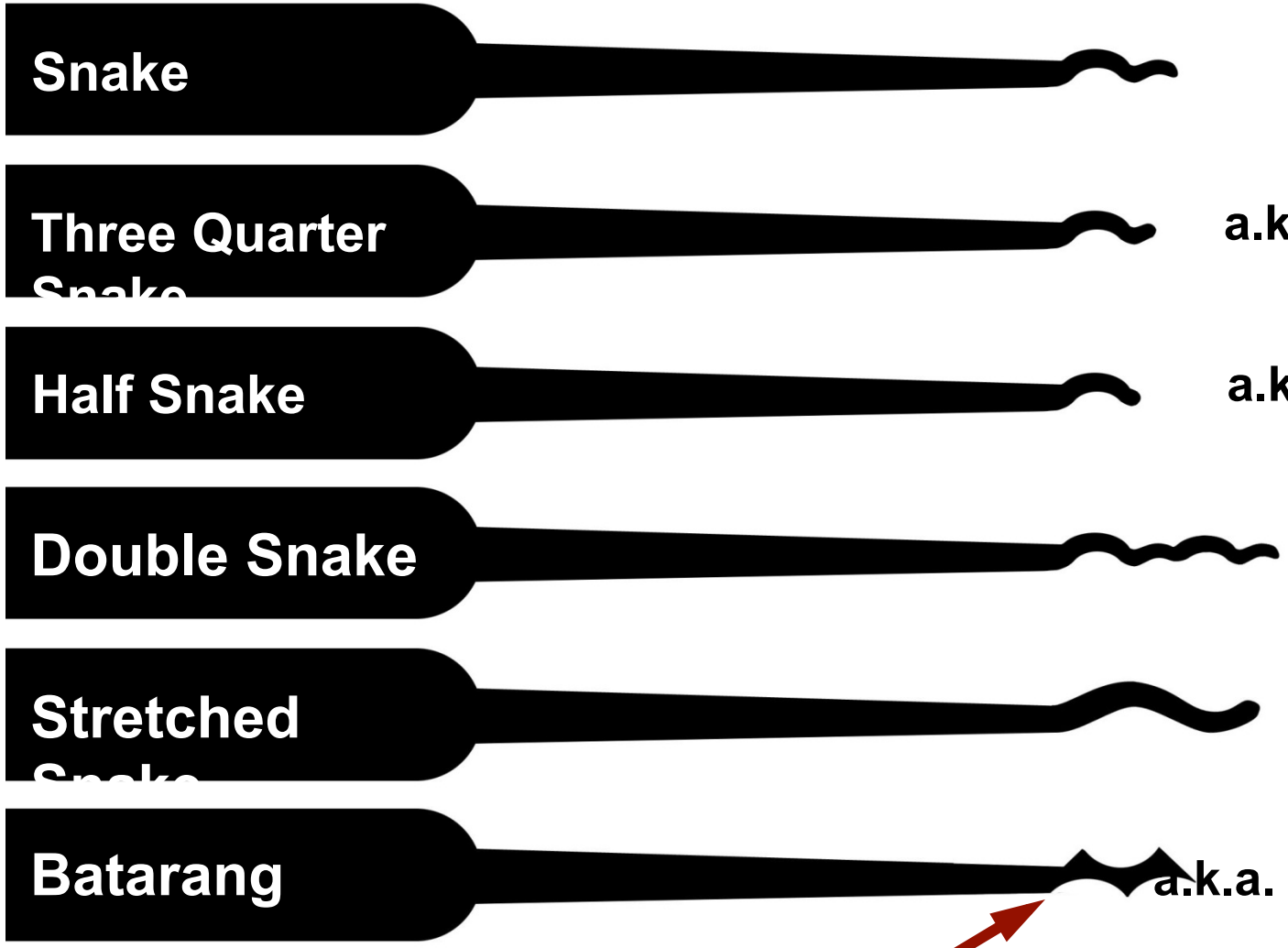
a.k.a. Single Rake

a.k.a. Quad Rake

a.k.a. S Rake

a.k.a. S Rake, Camel Back

Raking Tools



a.k.a. C Rake, Double Rake

a.k.a. Rake-and-a-Half

a.k.a. Single Rake

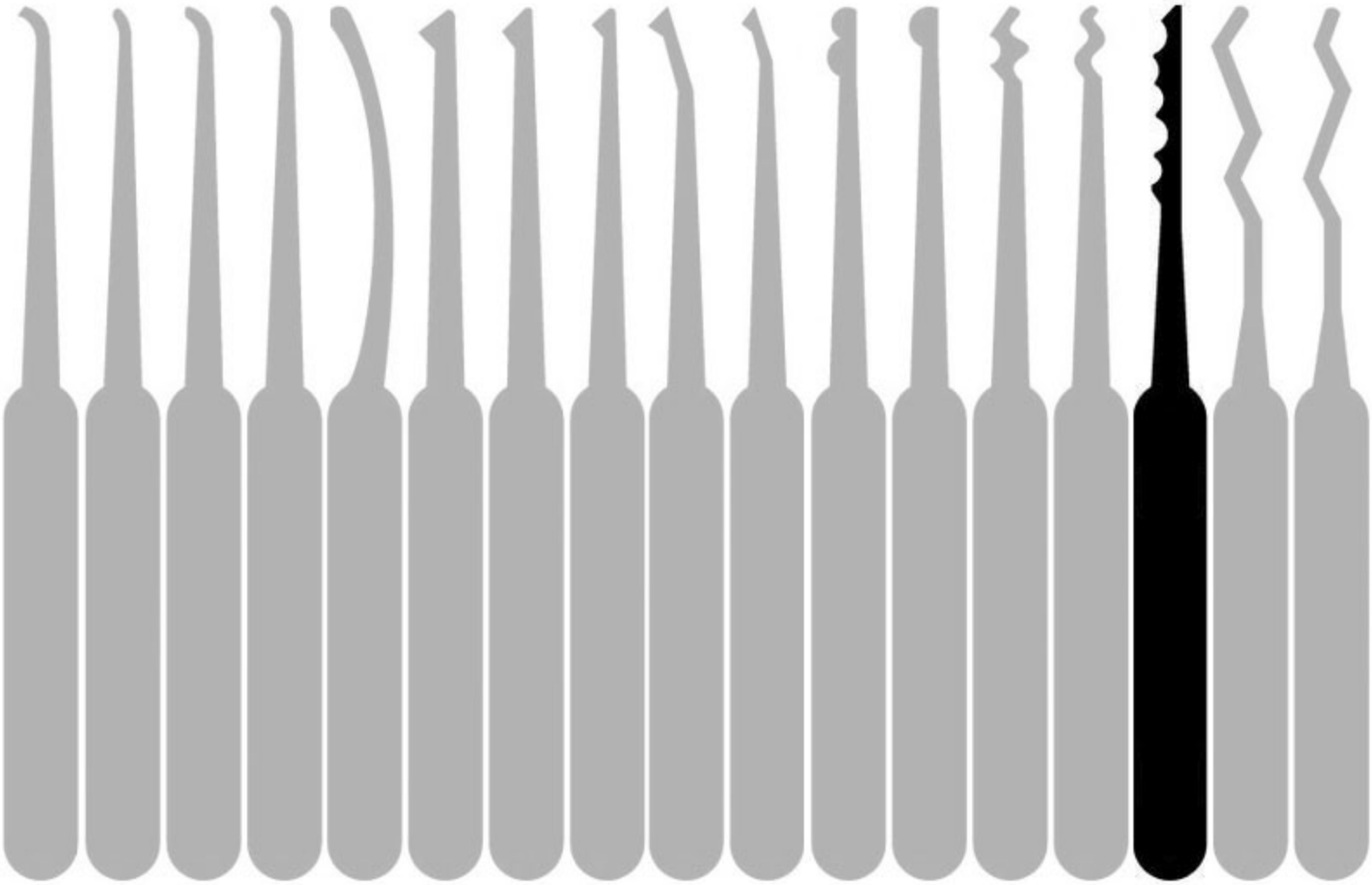
a.k.a. Quad Rake

a.k.a. S Rake

a.k.a. S Rake, Camel Back

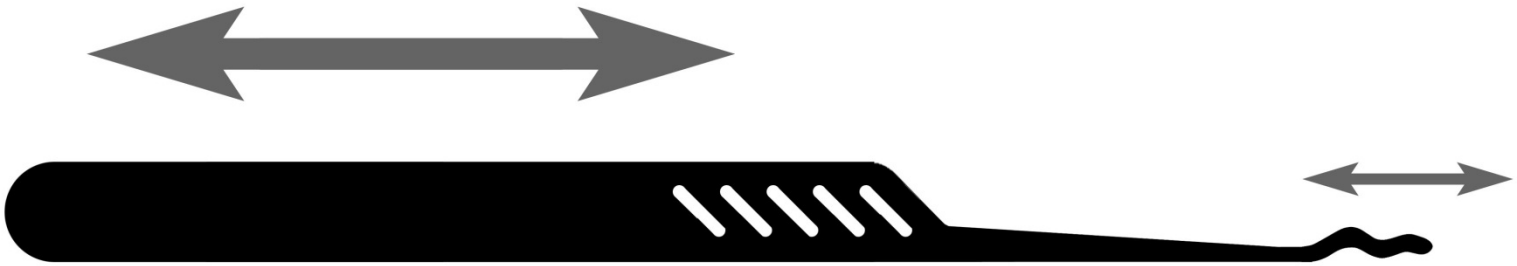
Dangerous Weakness

What about something like *this*…

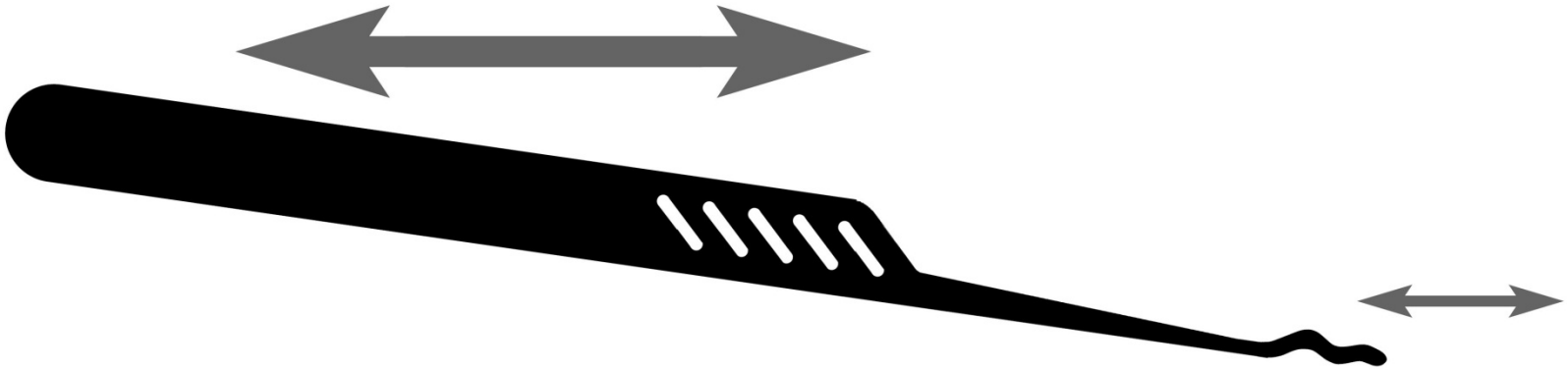


“Raking” vs. “Lifting”

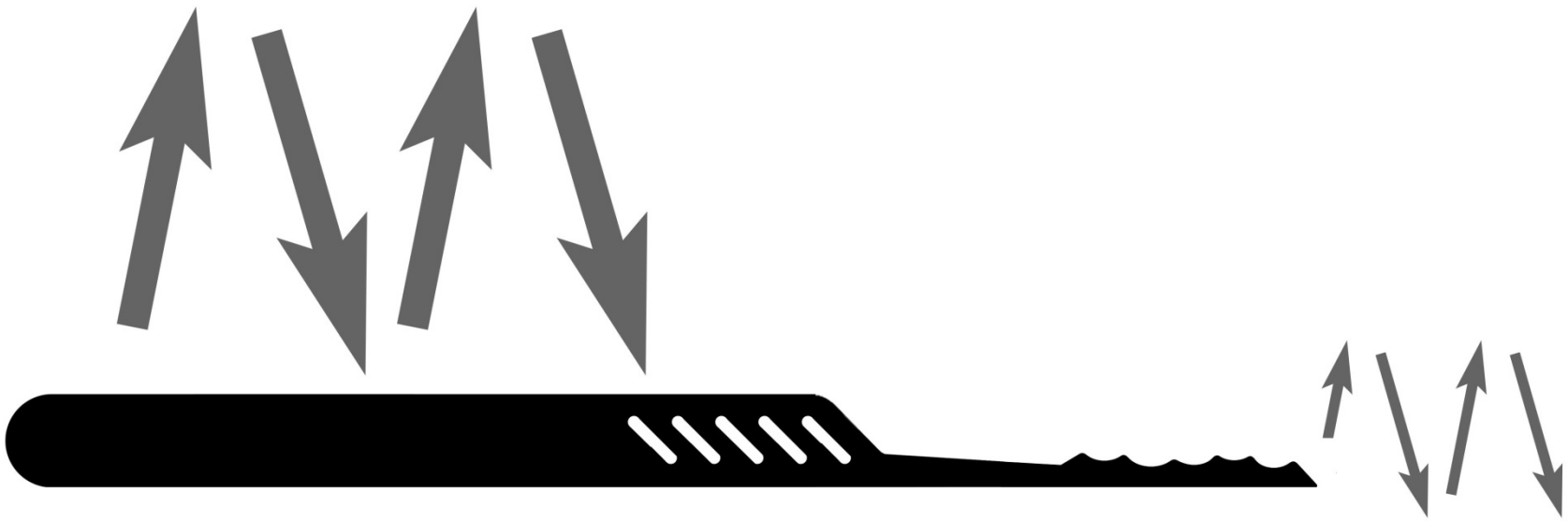
Raking



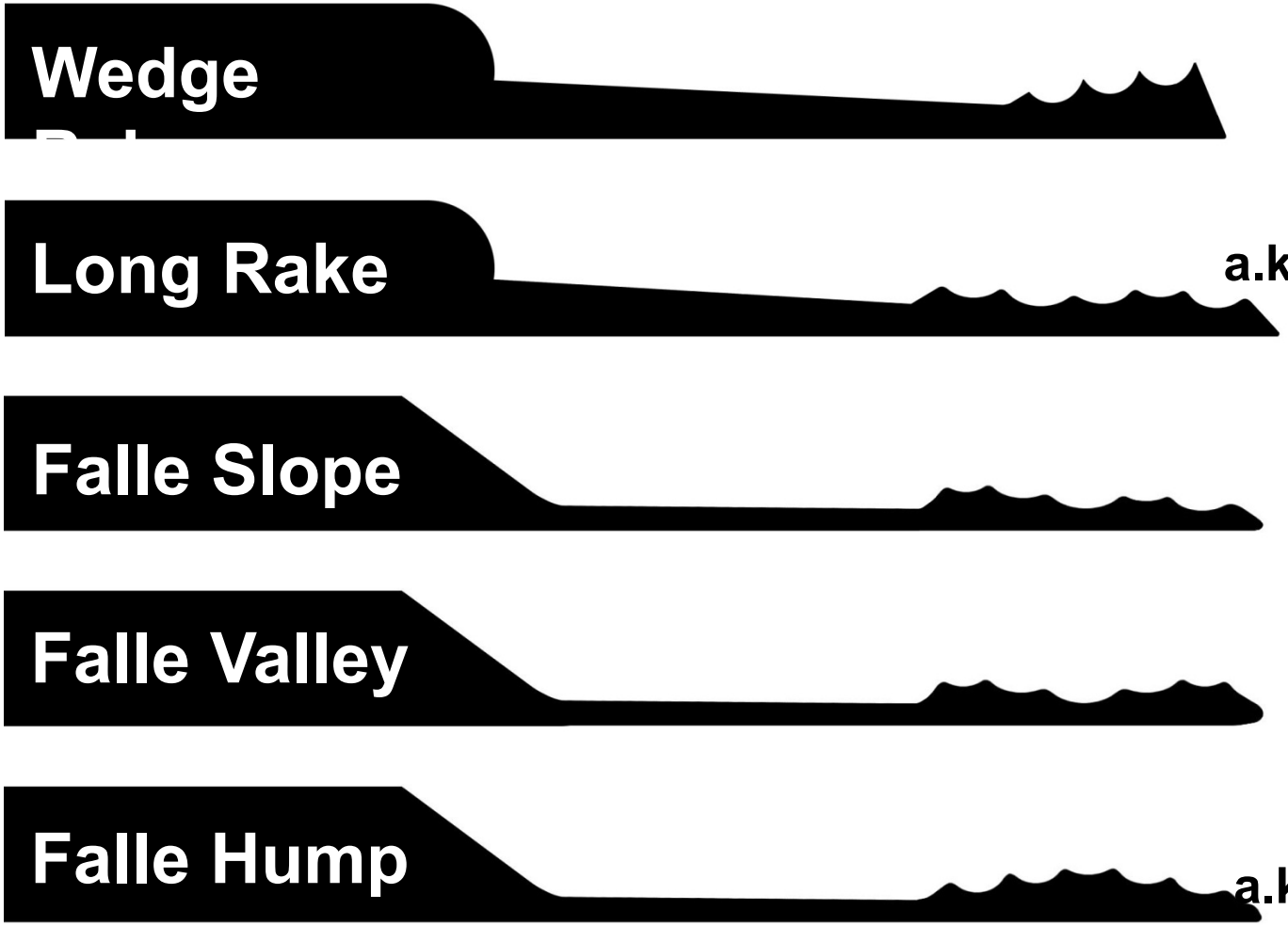
Raking



Lifting



Jagged Lifters

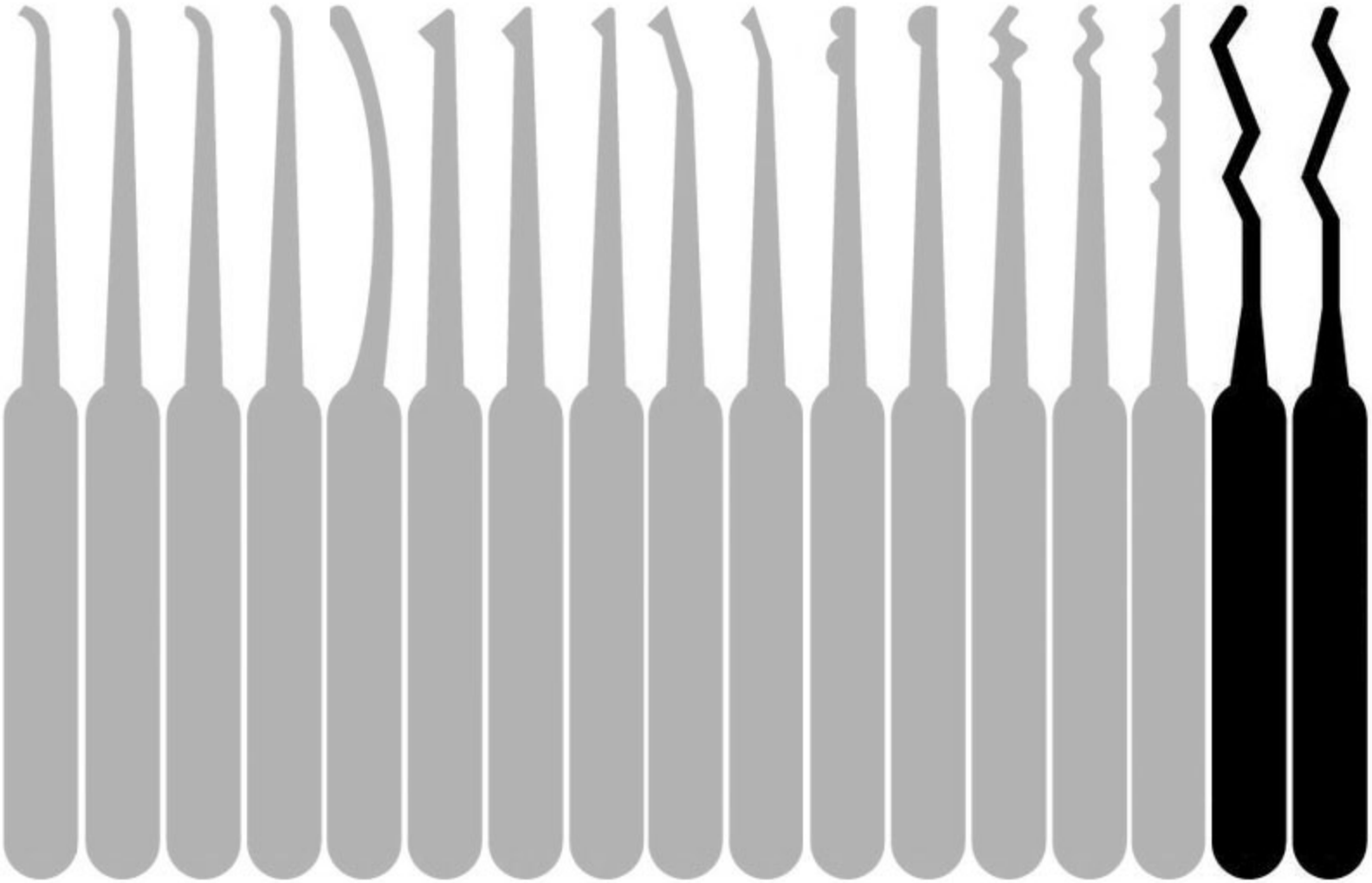


a.k.a. W Rake, Short Jag, Ramped Tool, & Stuple

a.k.a. L Rake, Long Jag, Ripple, & Saw Tooth

a.k.a. Long Rimple

So, what on earth are *these*?



King & Queen

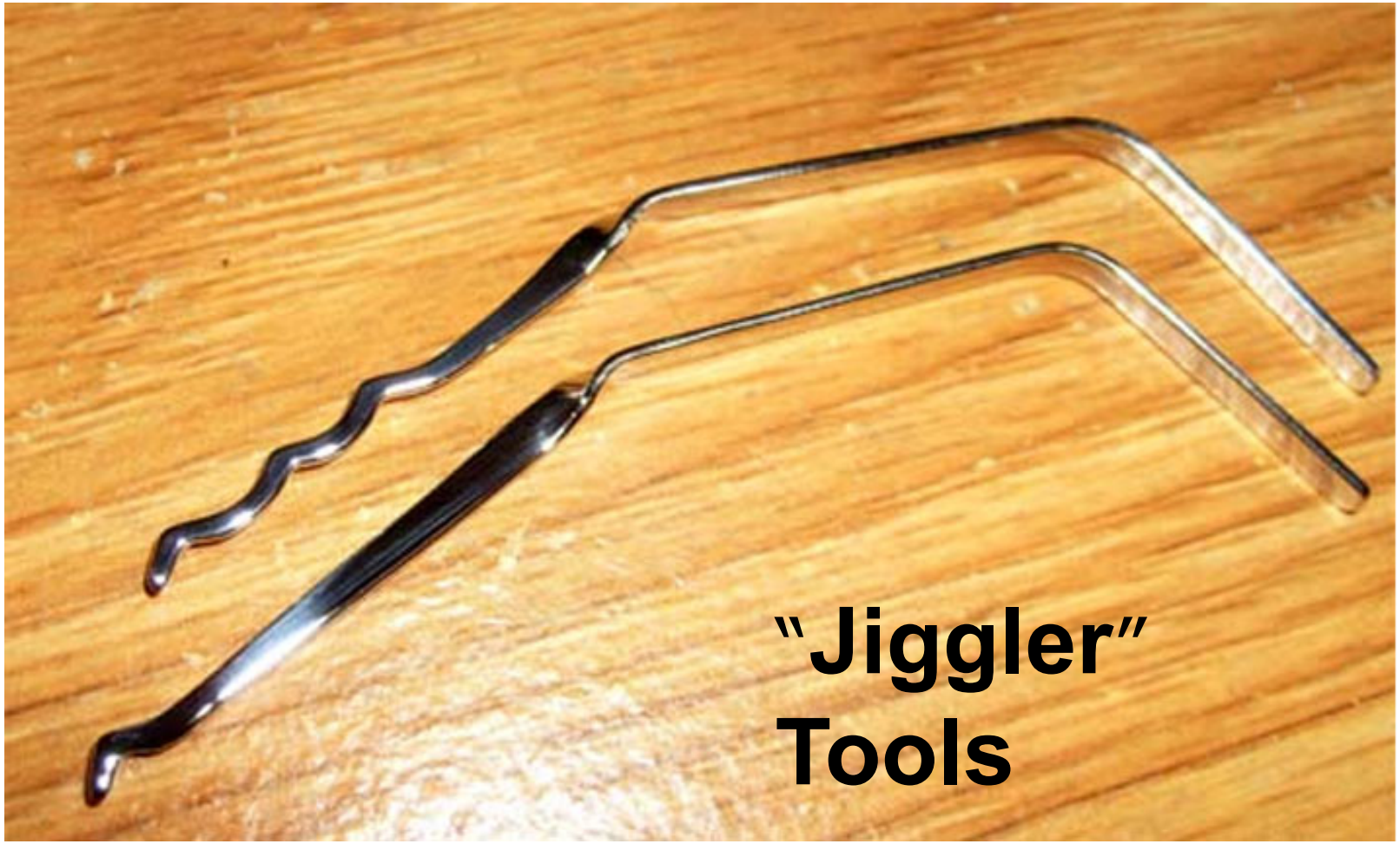
A major innovation in pick tools

Thanks to Minnesota…

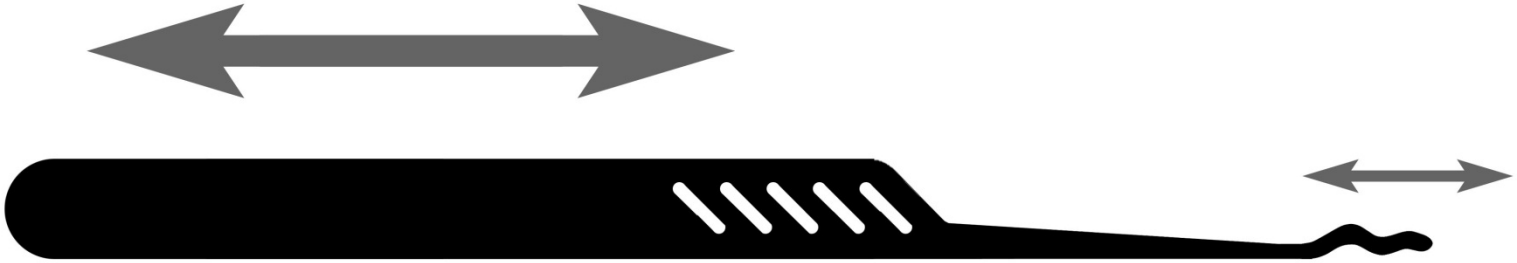
… with a nod to Colombia

Raimundo's Family of Tools

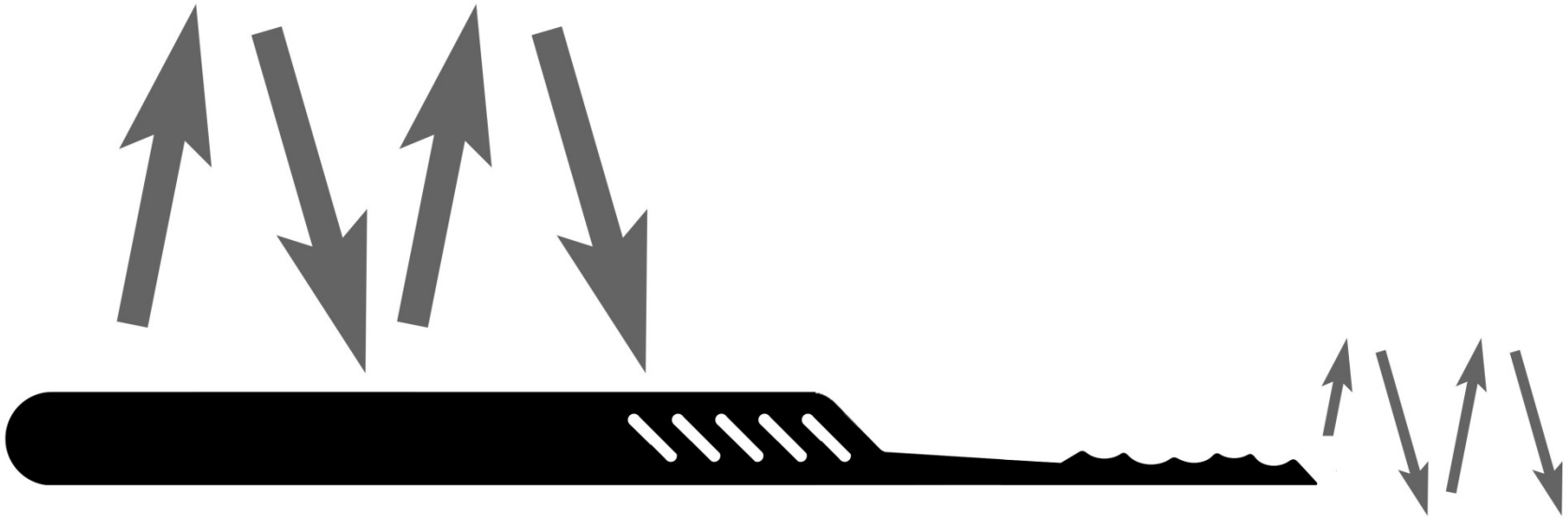
It Started with Two Tools…



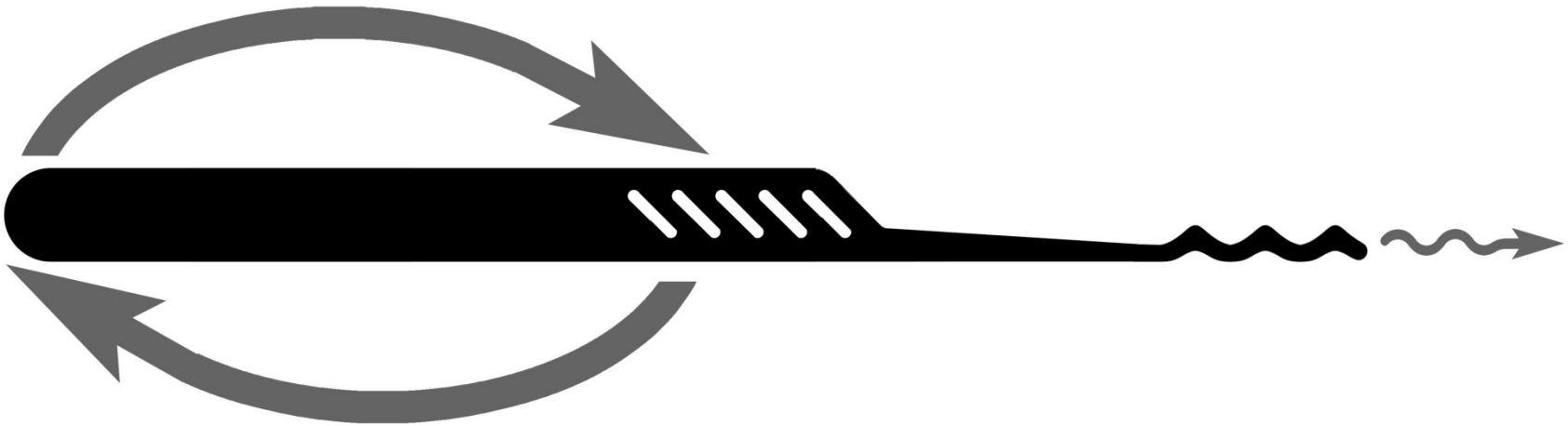
What is Jiggling？



In Between Raking & Lifting…



What is Jiggling？

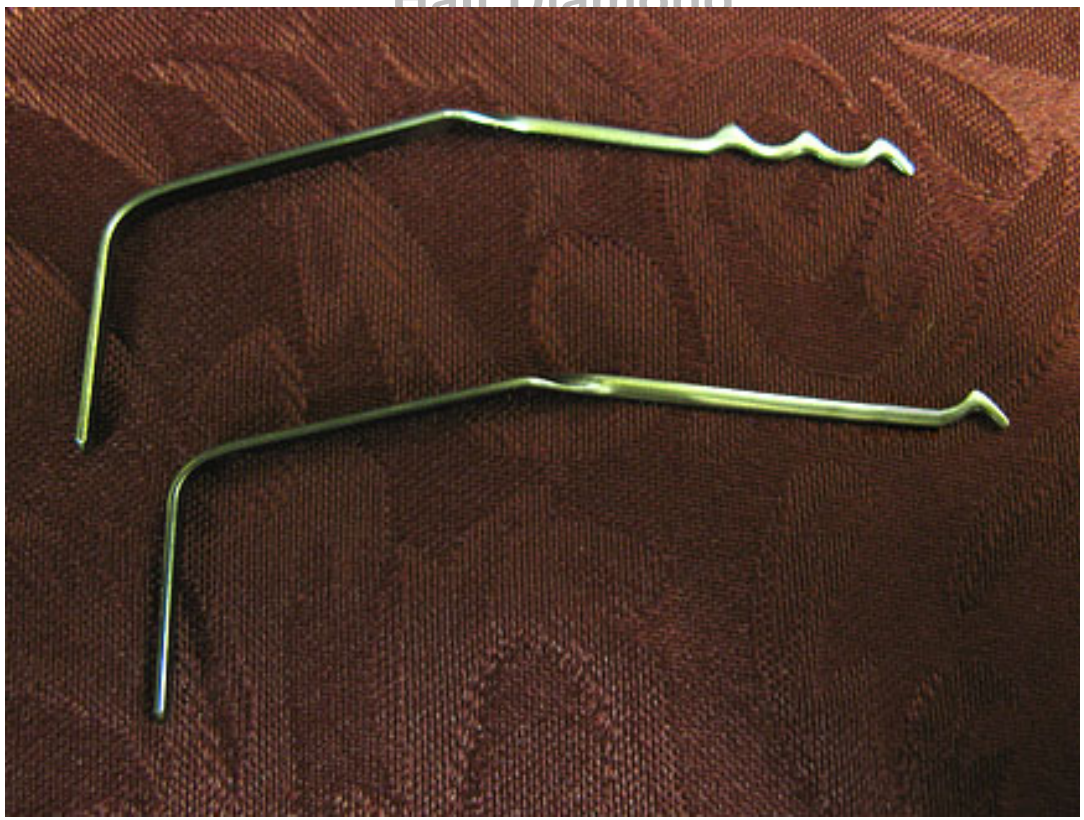


… There is “Jiggling”

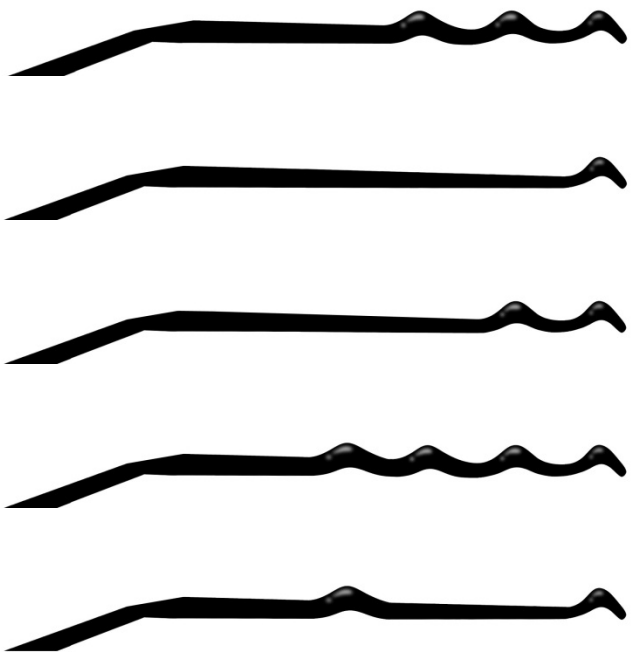
Bogota Family

Bogota

Single Hump a.k.a. Hollow Half Diamond



Bogota Family



Bogota

Single Hump a.k.a. Hollow Half Diamond

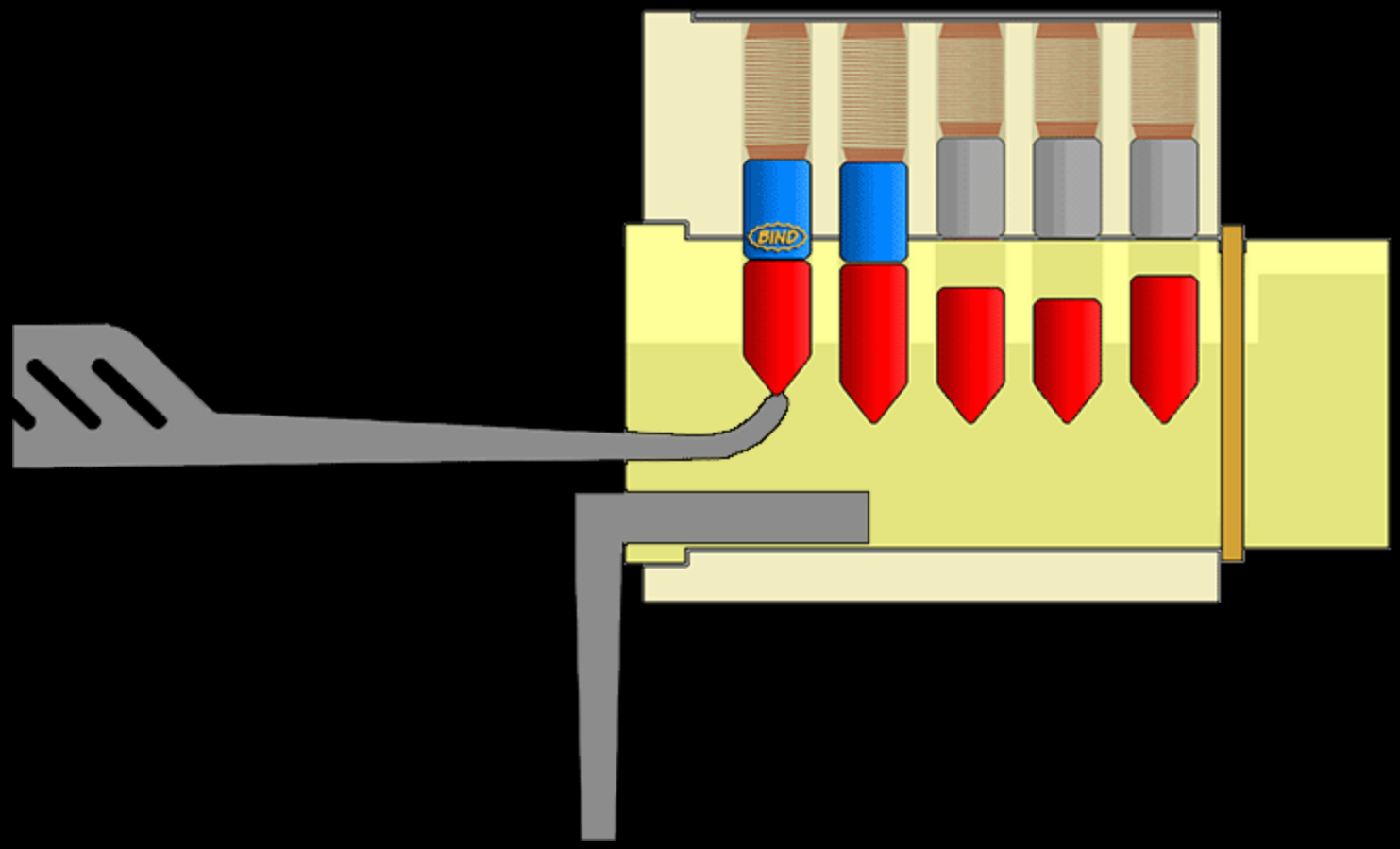
Two Hump a.k.a. Camel

Quad Hump

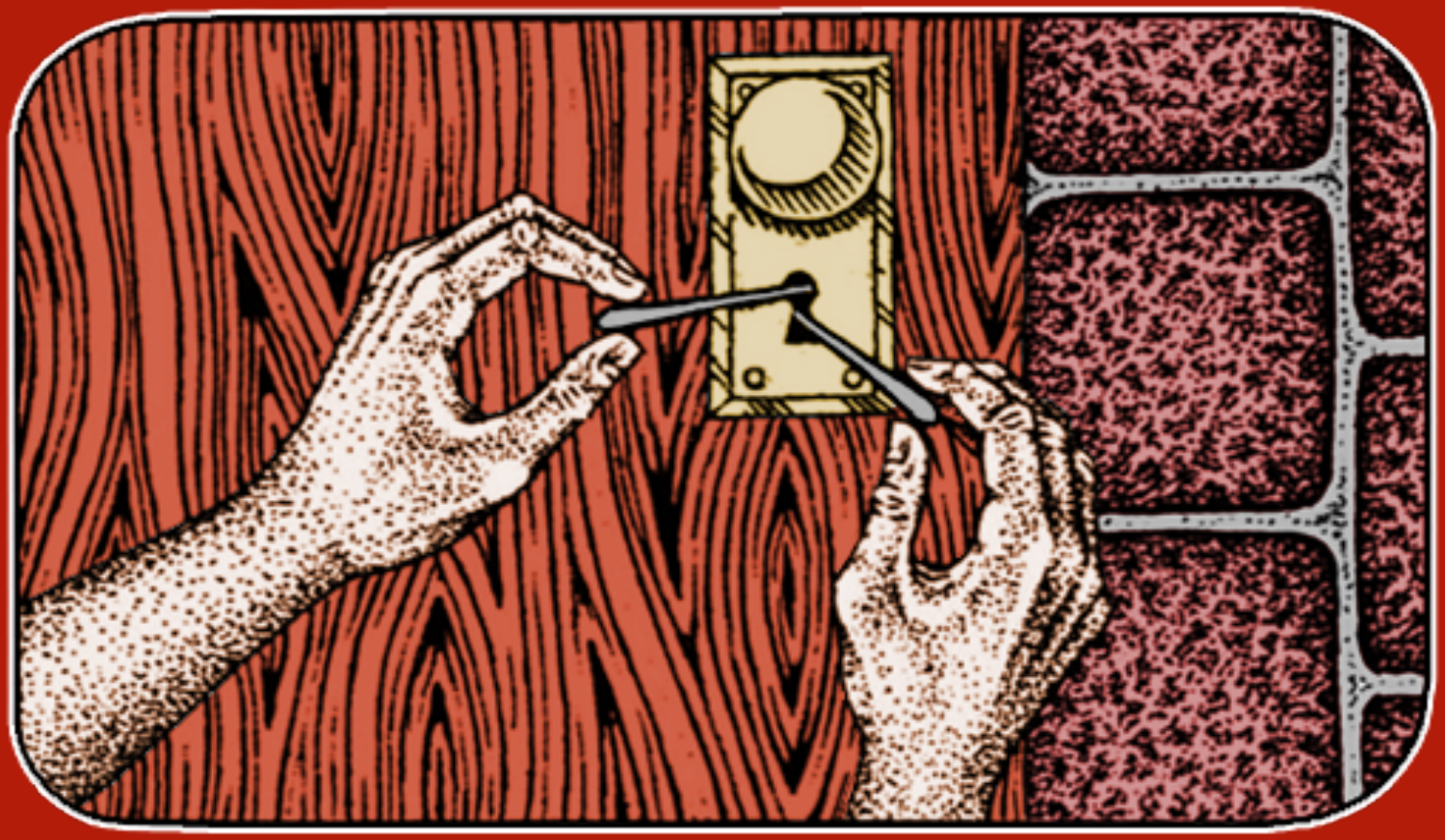
Sabana

http://theamazingking.com/bogota.html

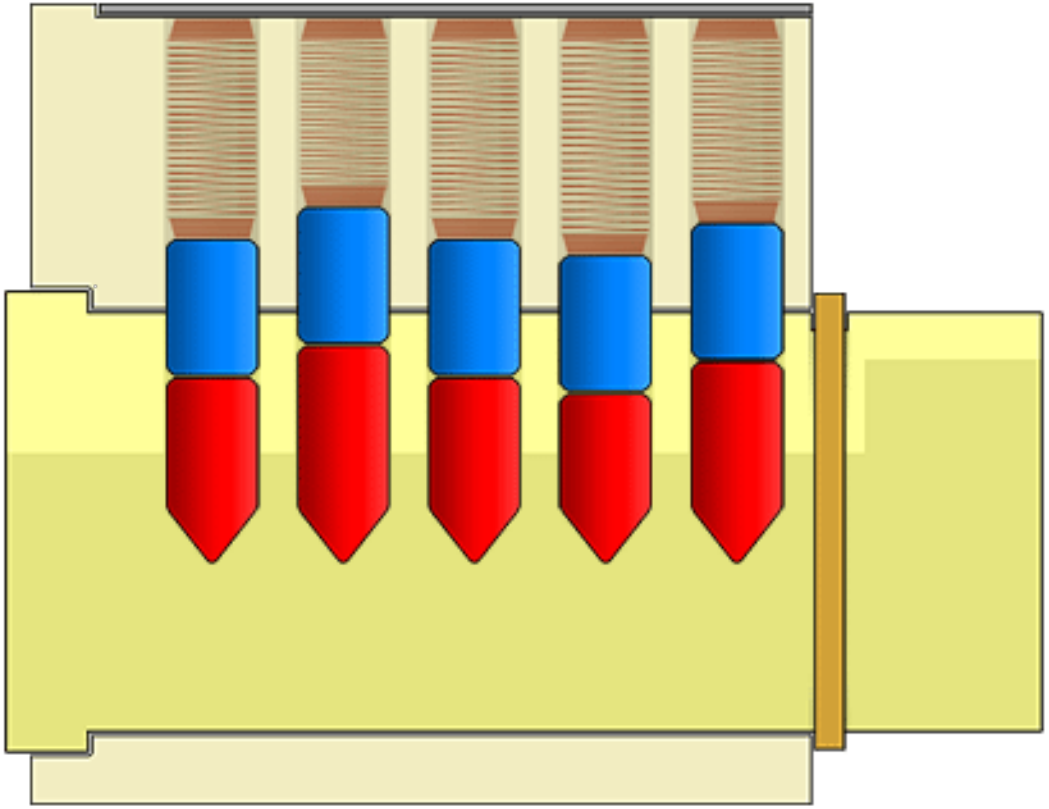
Questions?



Lockpicking & Forensics

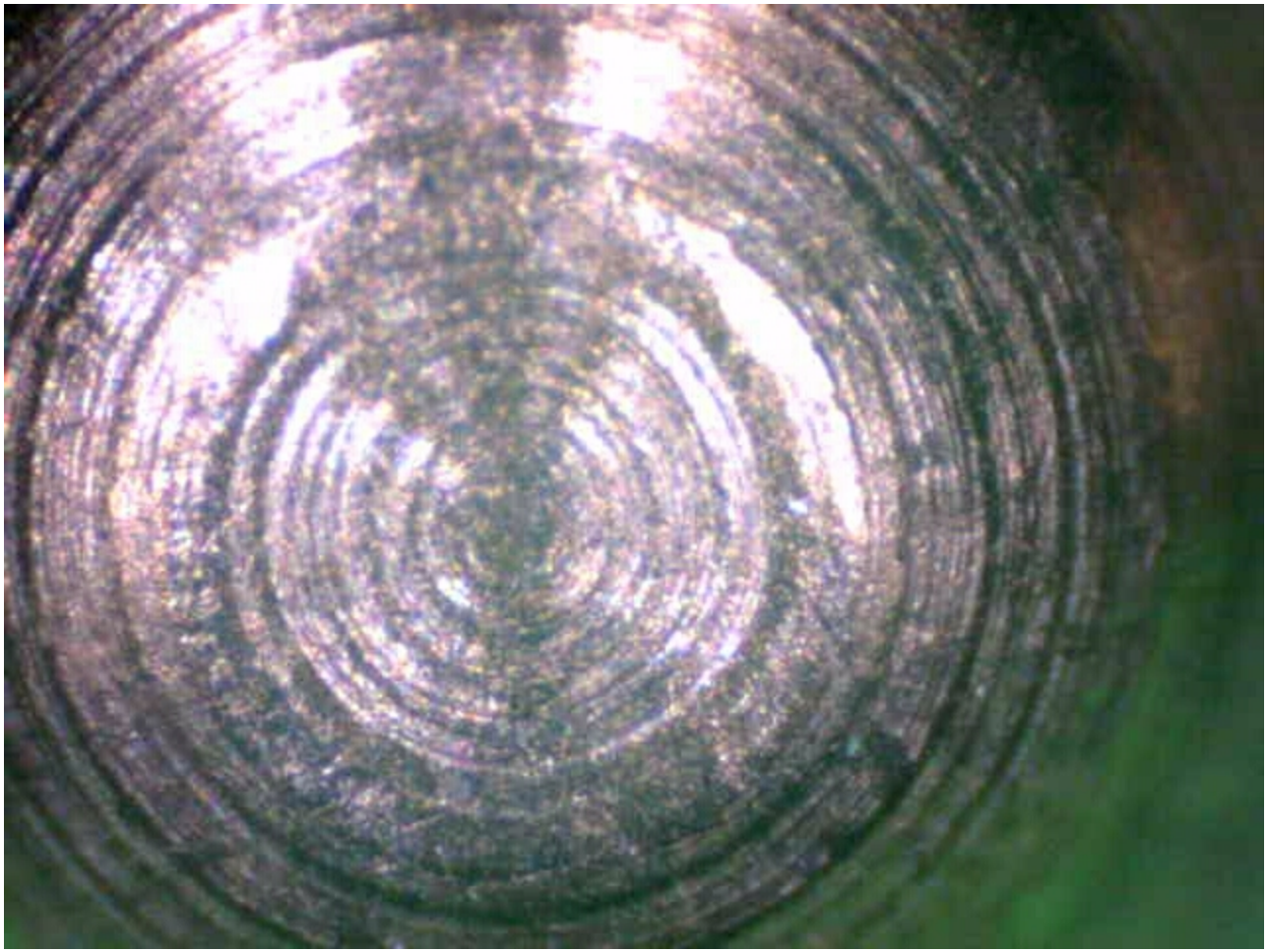


Keys Touch Very Specific Places



Virgin Pins Have Specific Patterns From Manufacturing

Concentric Tiny Ridges on Pin Face



Those Rings "Polish Away" With Use

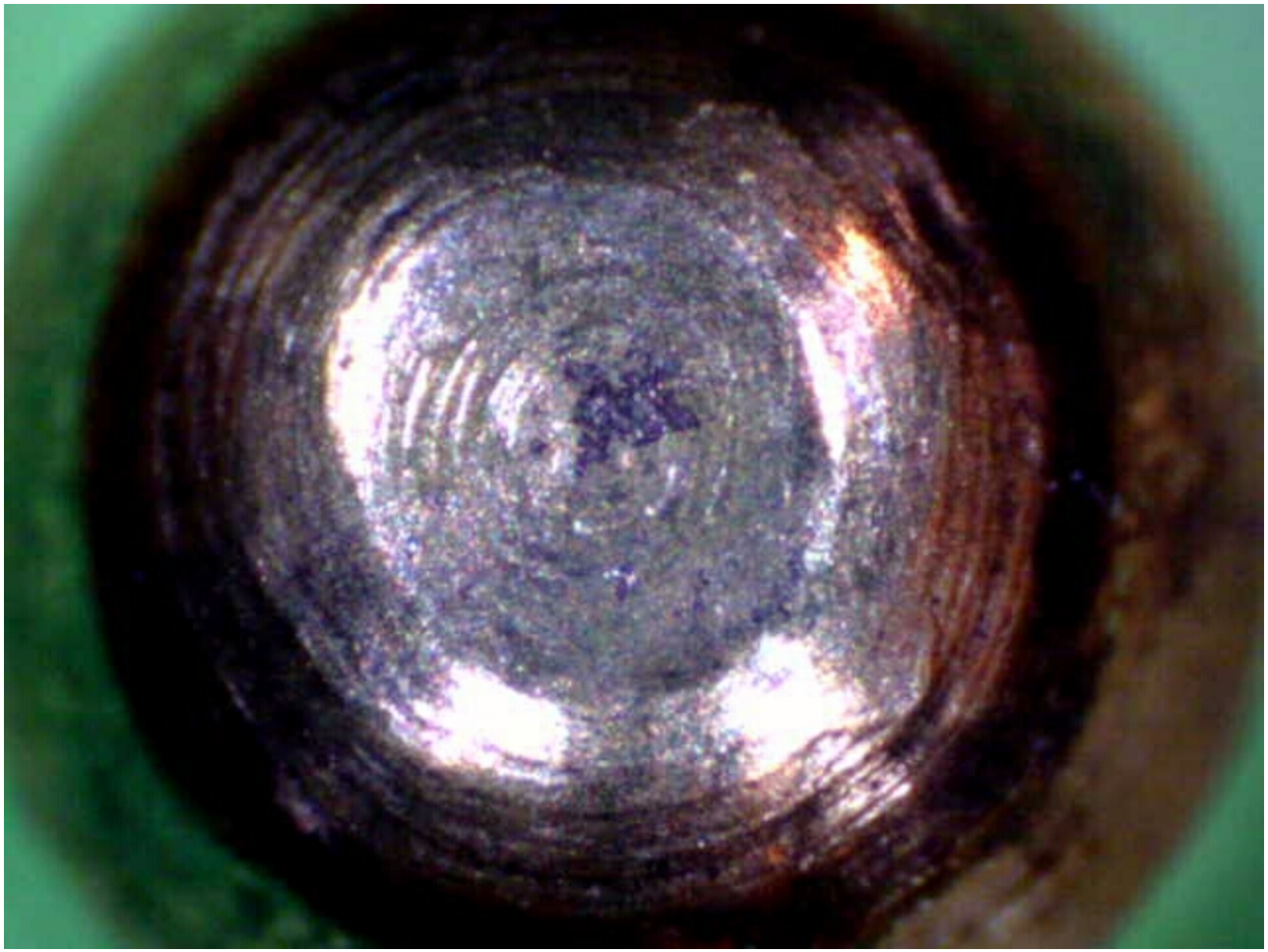
250 Uses

Those Rings "Polish Away" With Use

1500 Uses

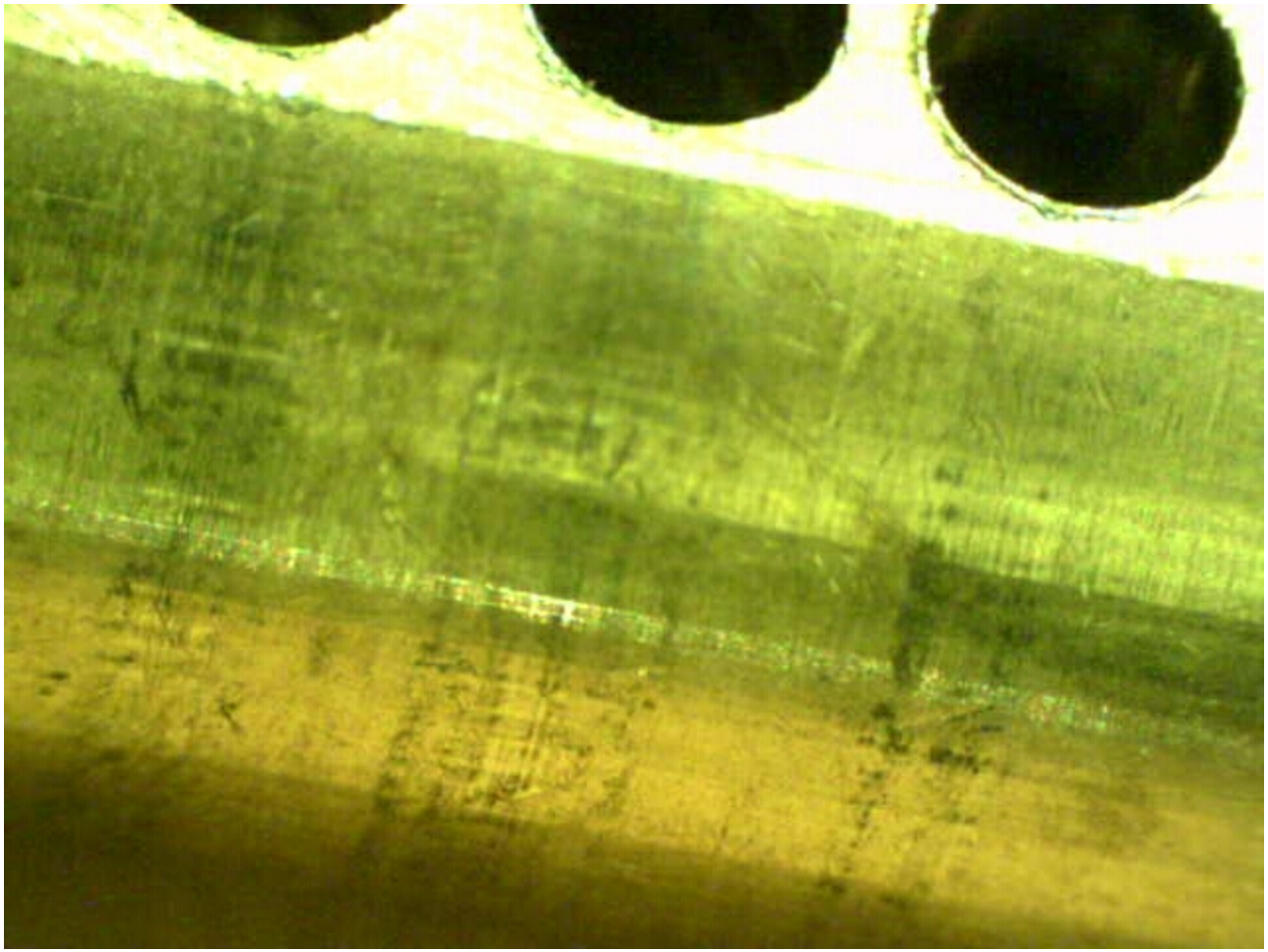
Those Rings "Polish Away" With Use

5000 Uses



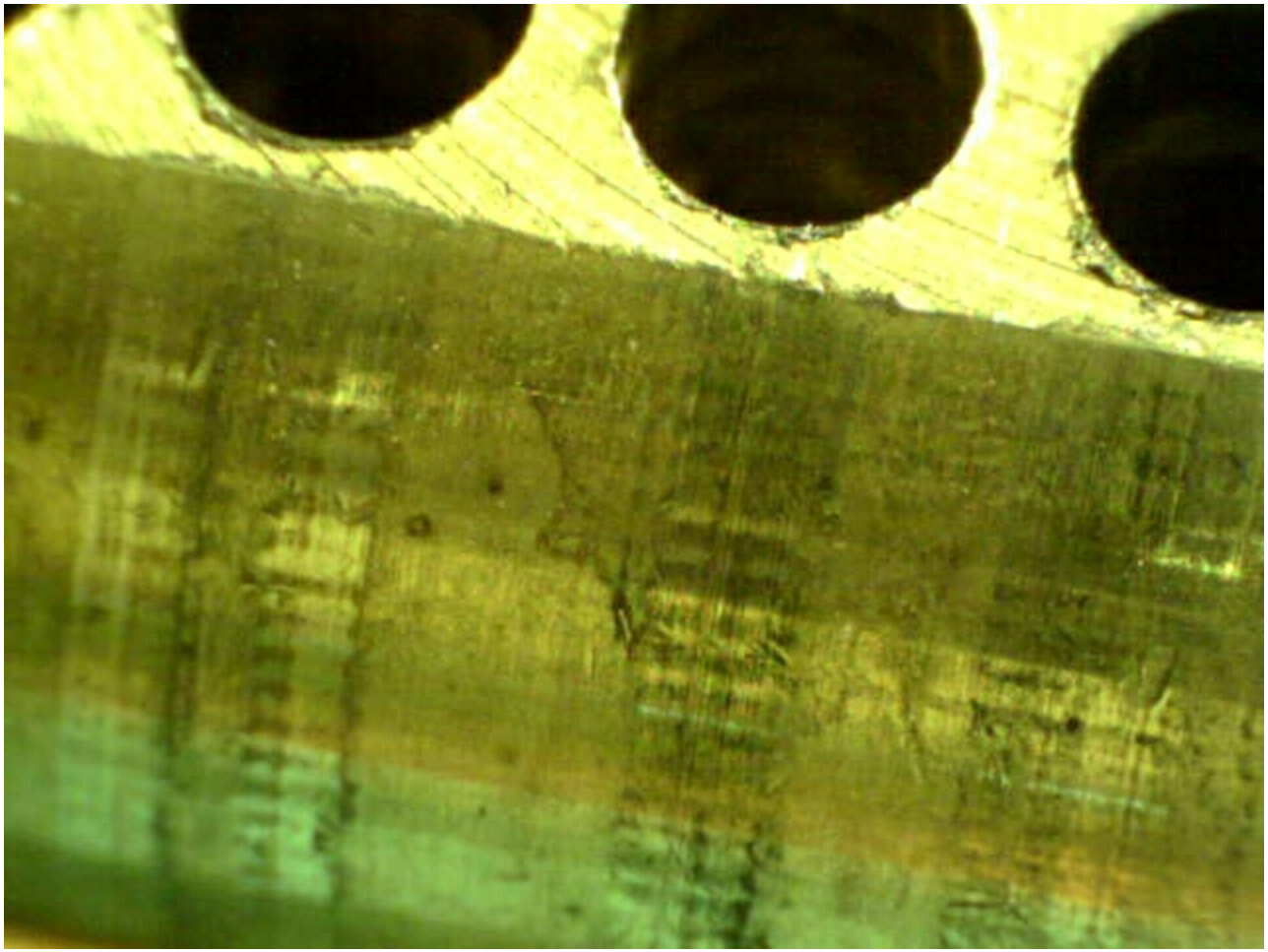
The Plug Picks Up Marks From Driver Pins

250 Uses



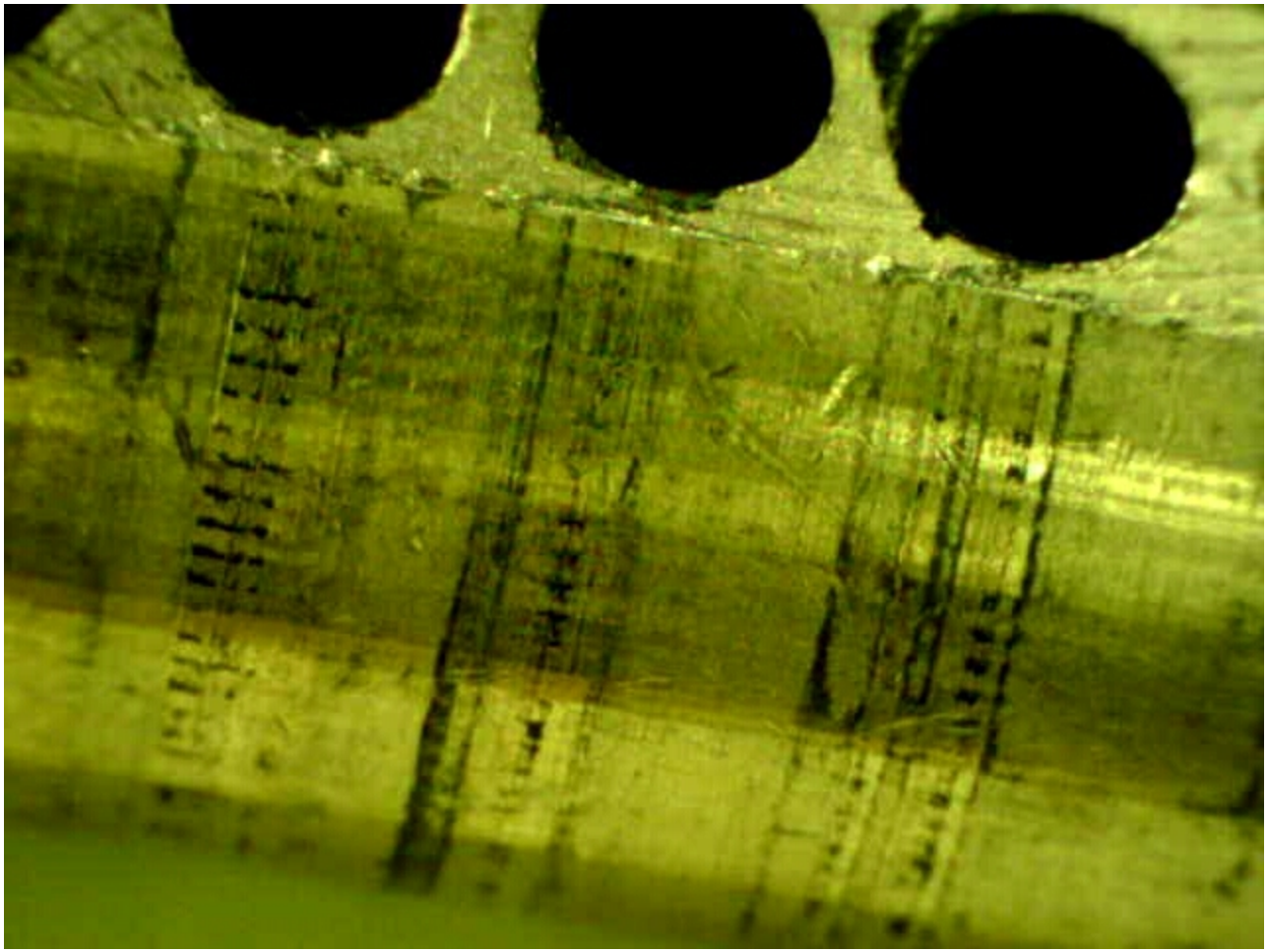
The Plug Picks Up Marks From Driver Pins

1500 Uses

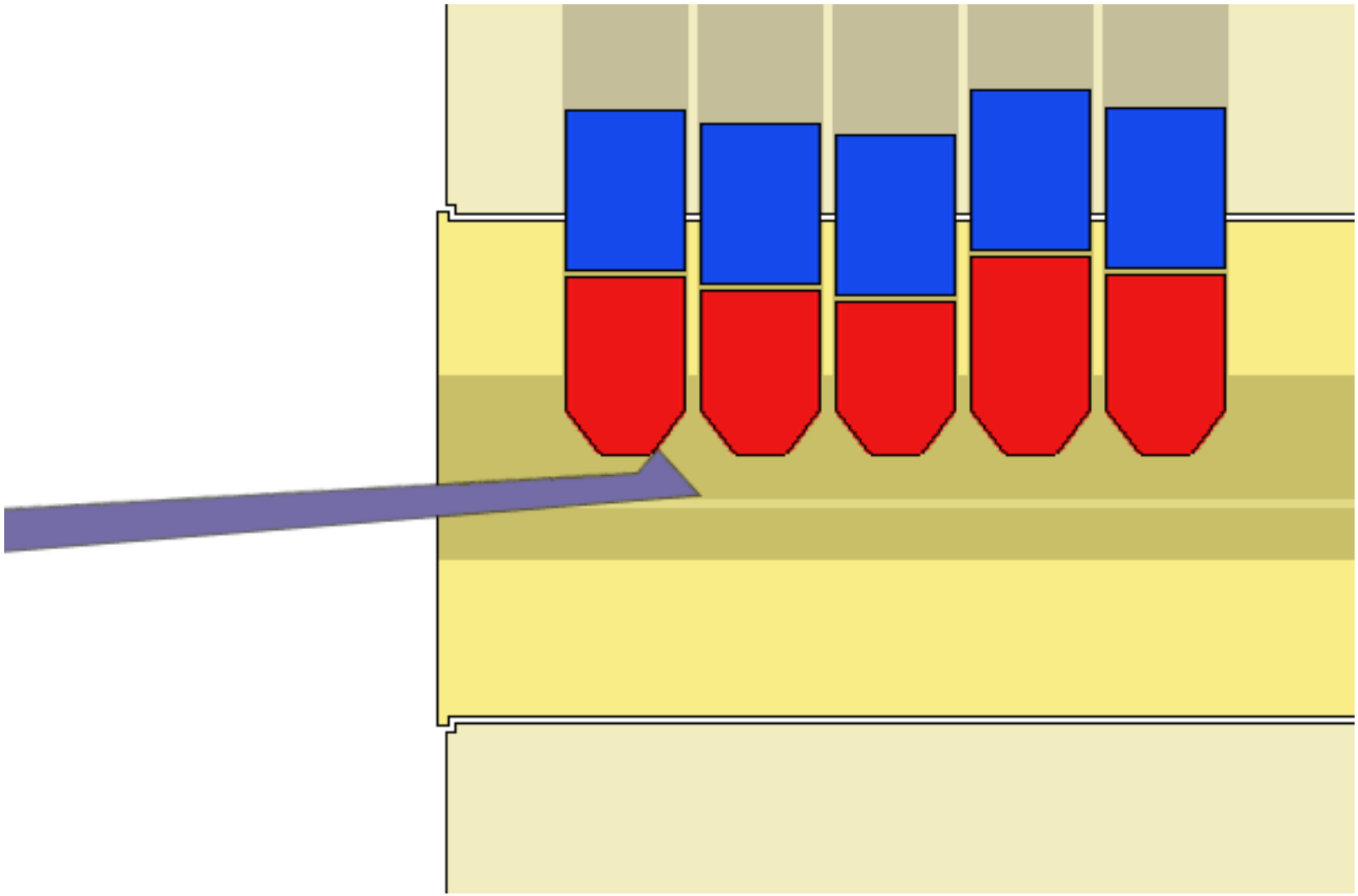


The Plug Picks Up Marks From Driver Pins

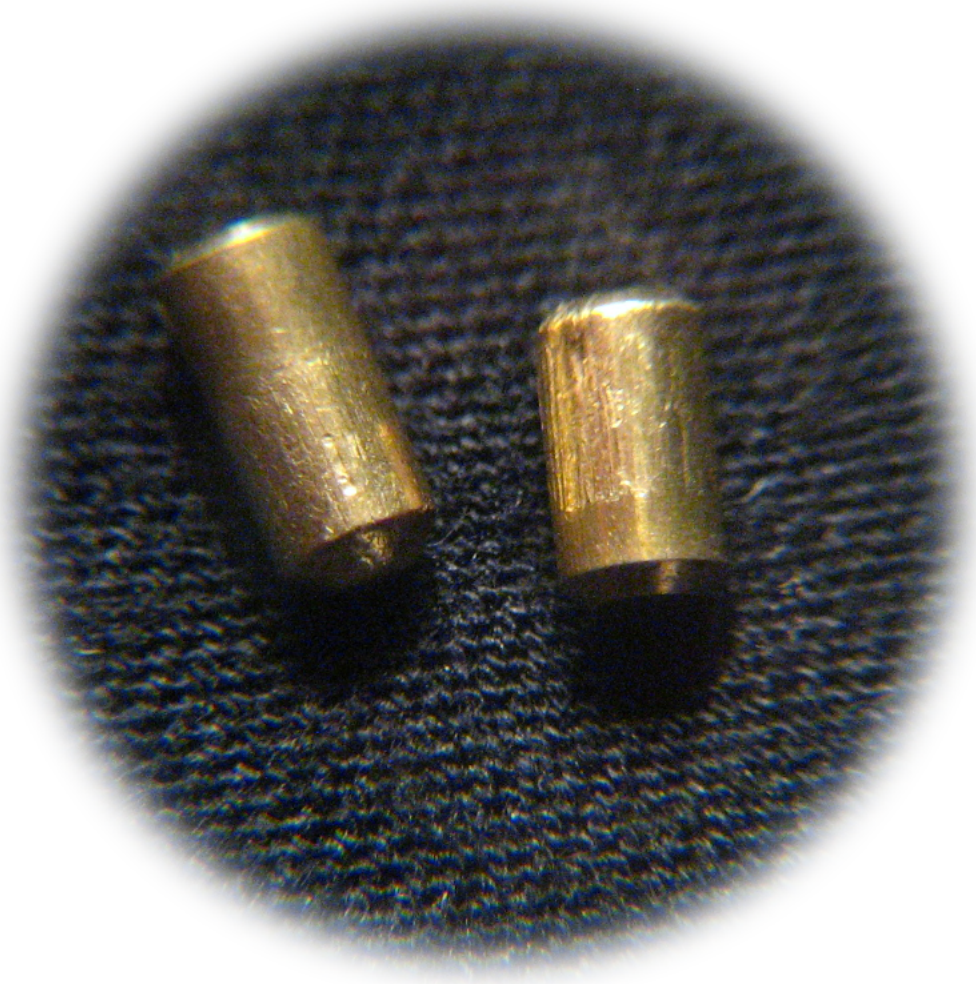
5000 Uses



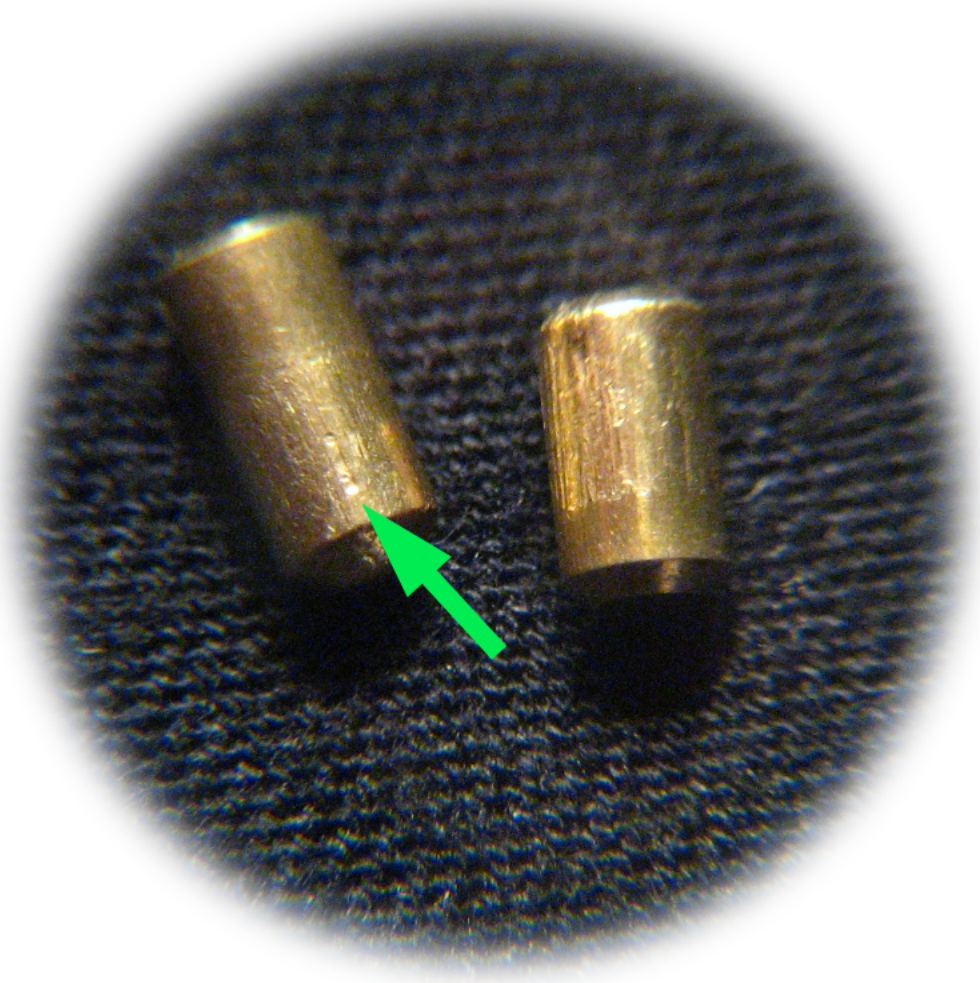
Picks Touch Places That Keys Don't



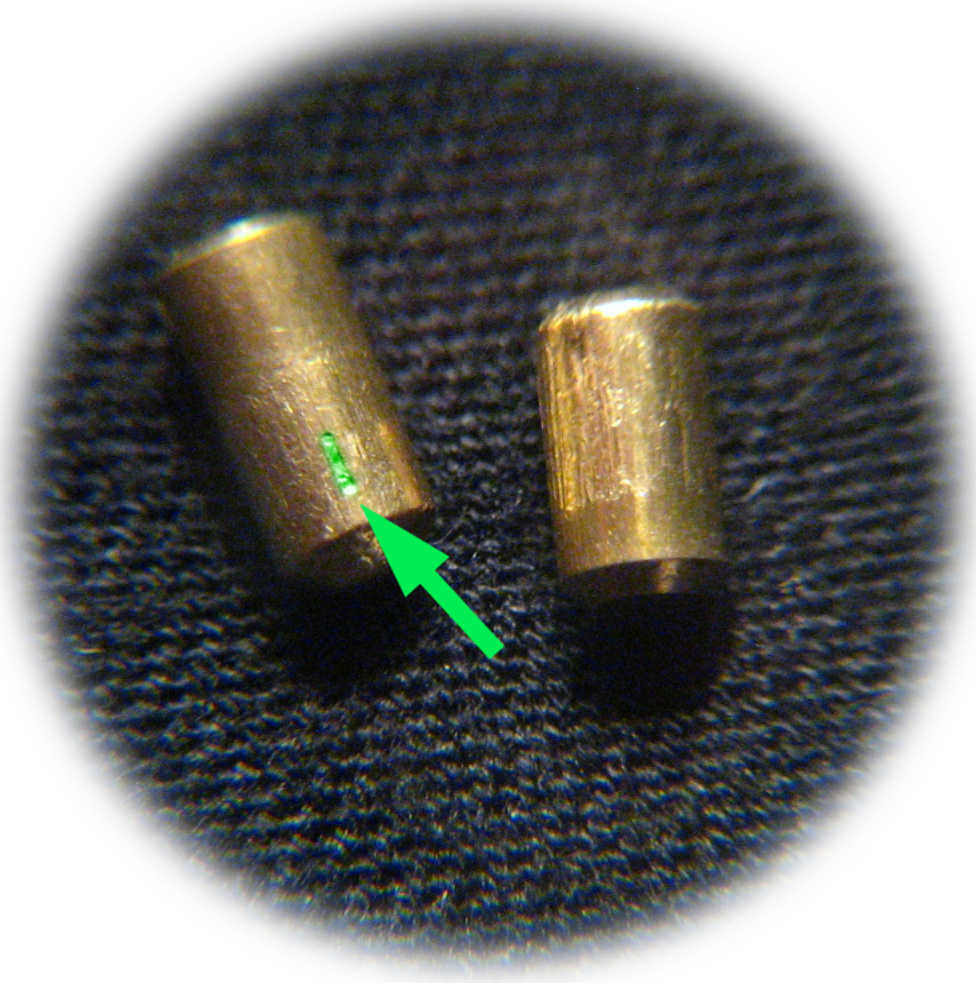
Wear and Tear or Toolmarks ?



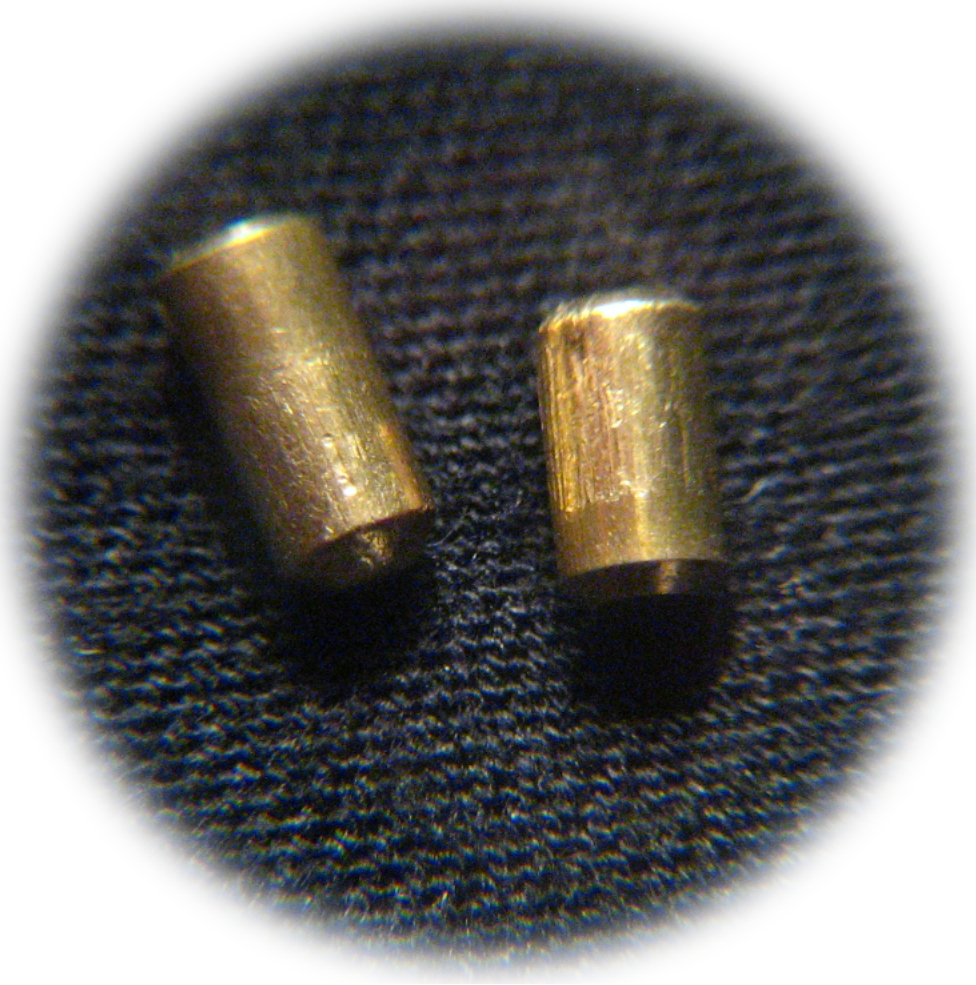
Wear and Tear or Toolmarks ?



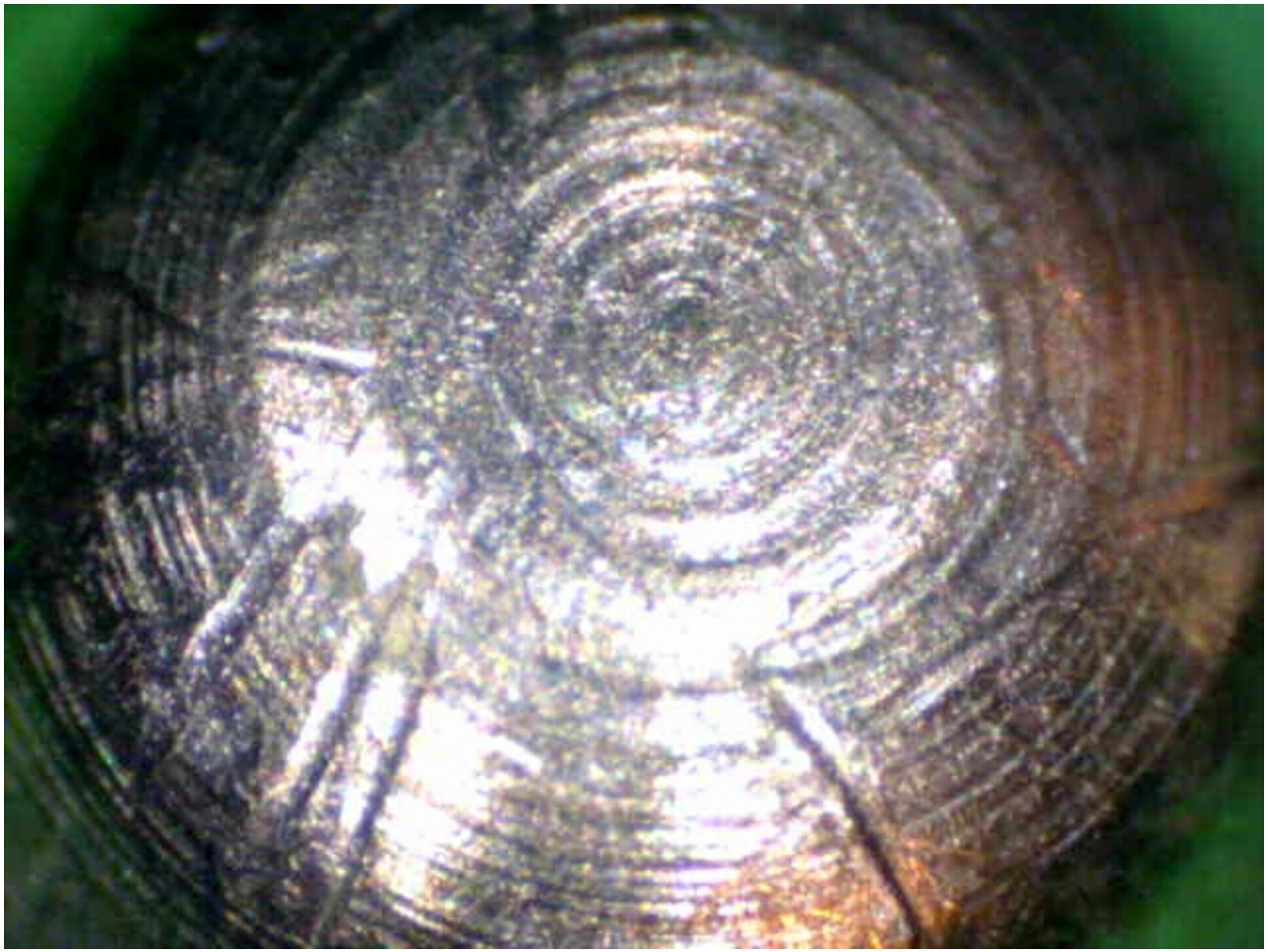
Wear and Tear or Toolmarks ?



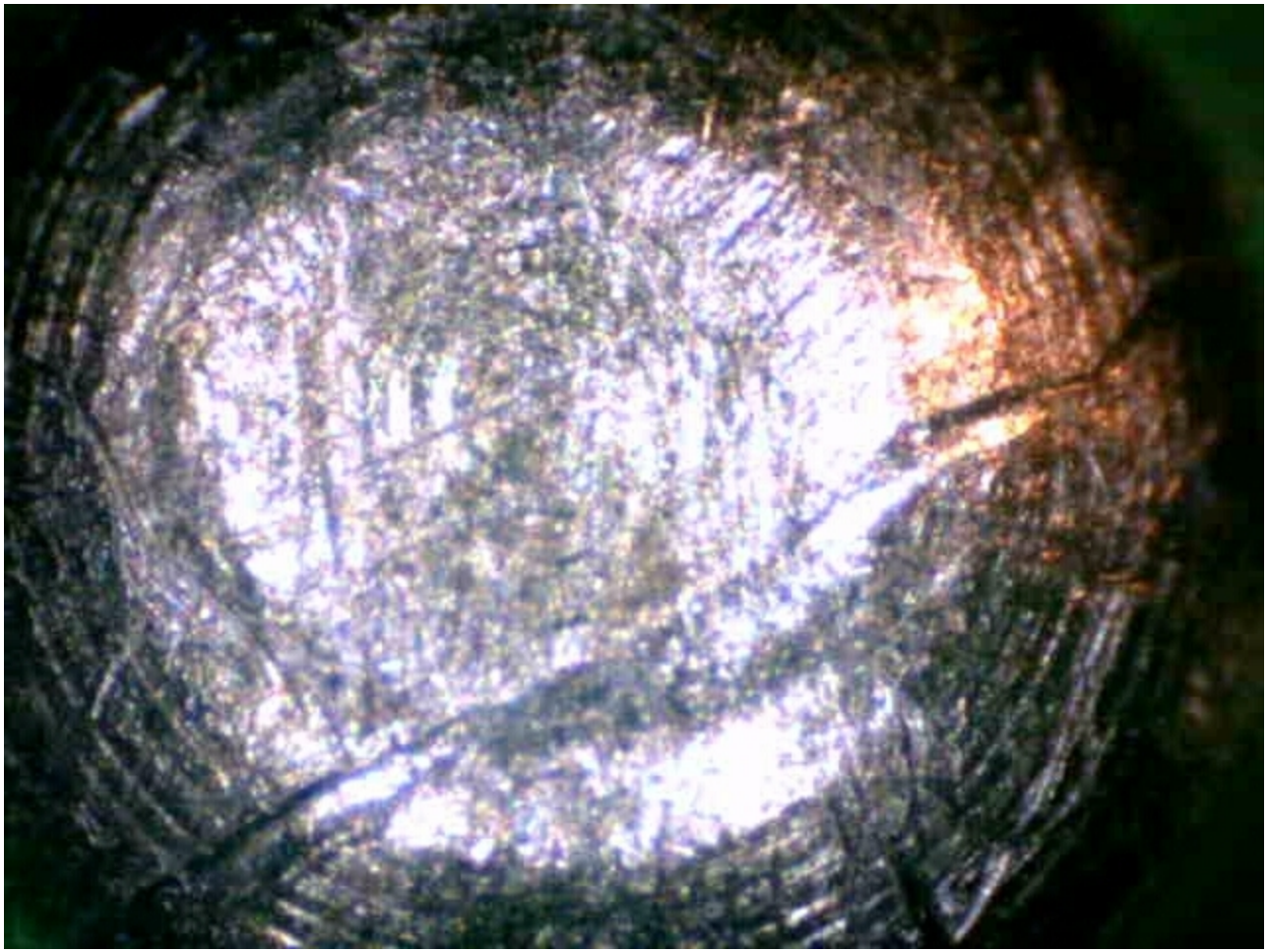
Wear and Tear or Toolmarks ?



Forensics – Lifting Picking



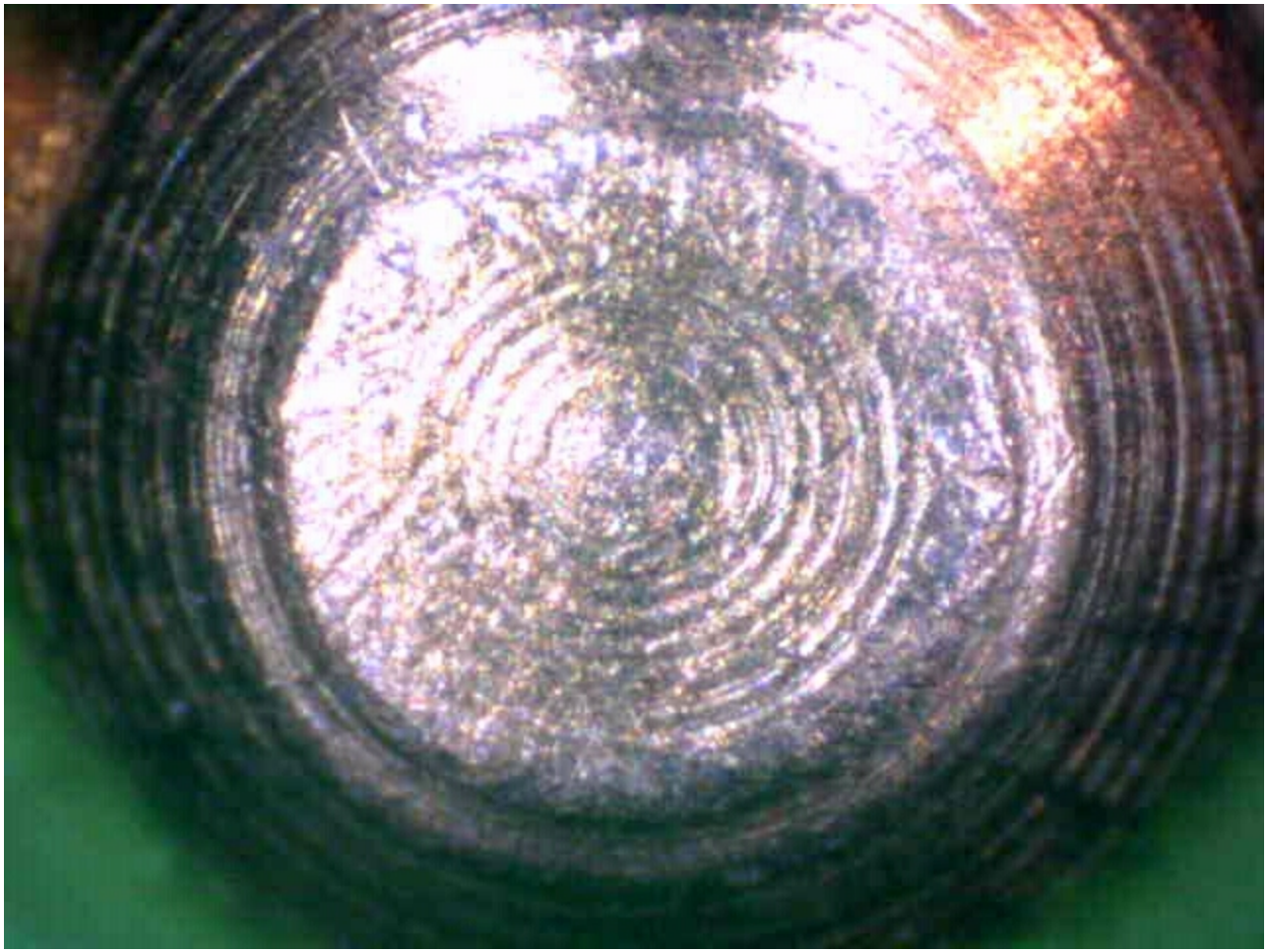
Forensics – Raking



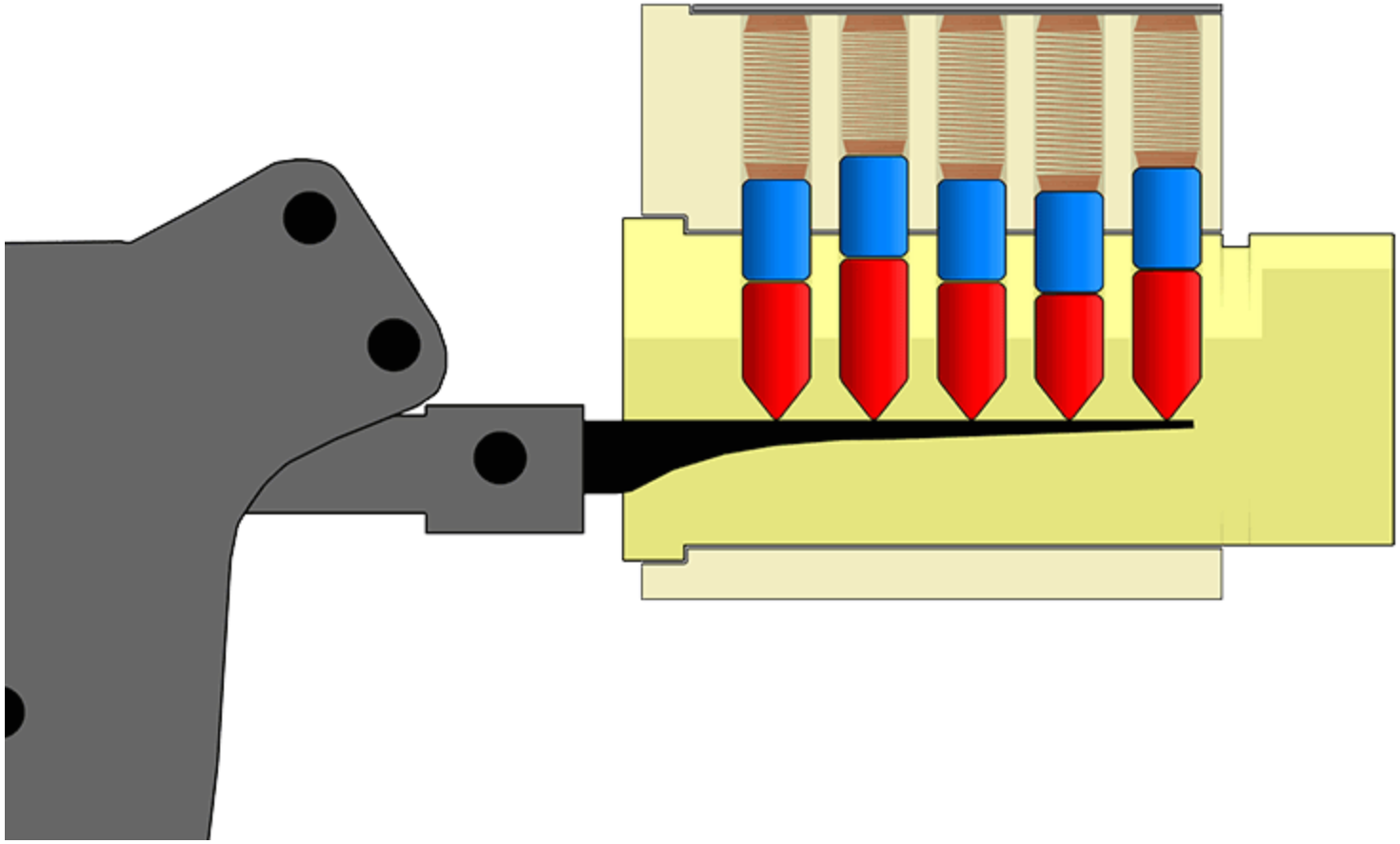
Forensics – Mixed Styles of Picking

Forensics – Ugh… Who Did This ??

Forensics – Even Skilled Pickers and Soft Touches Leave Marks

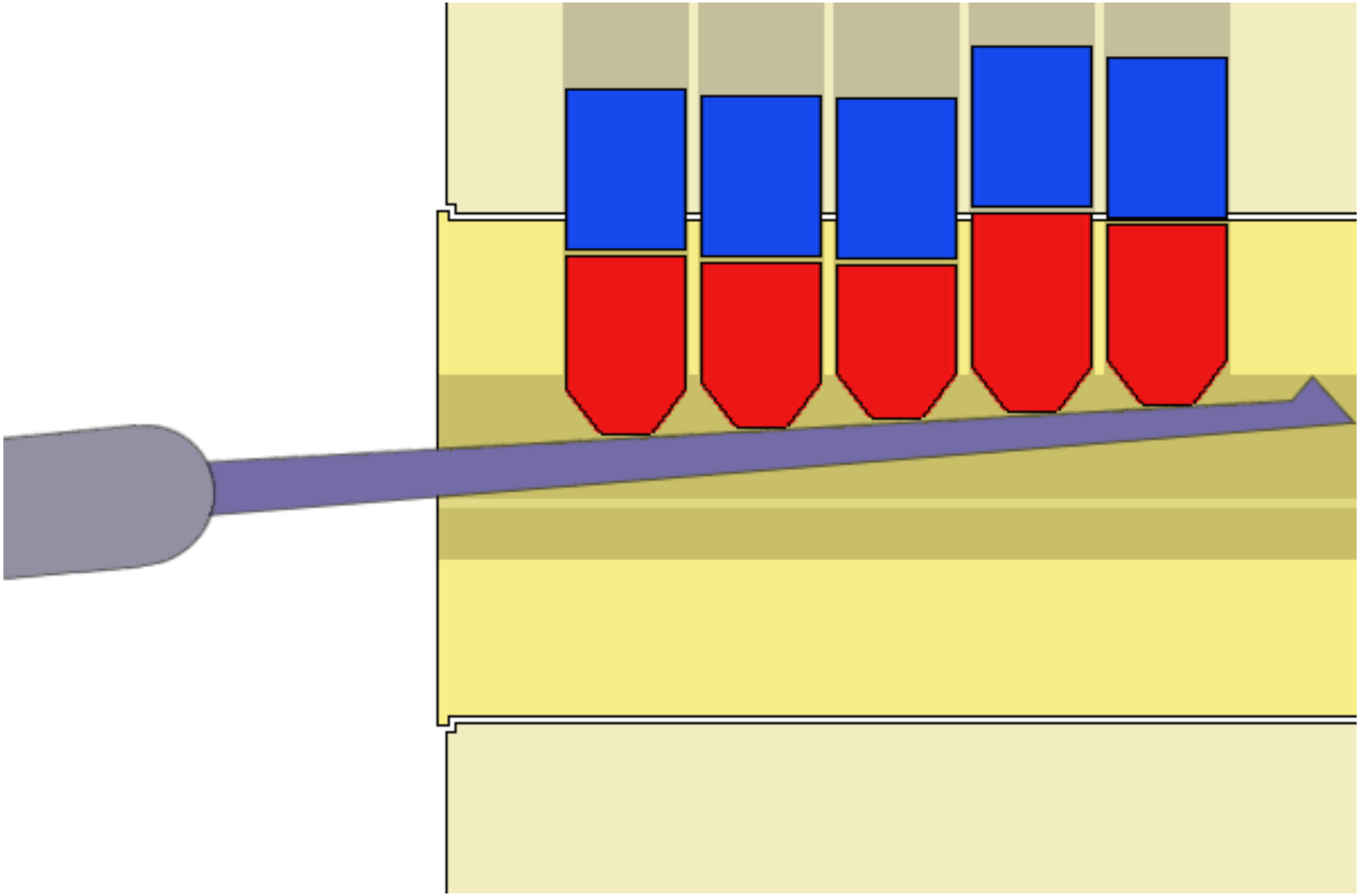


Forensics of Snapper Guns

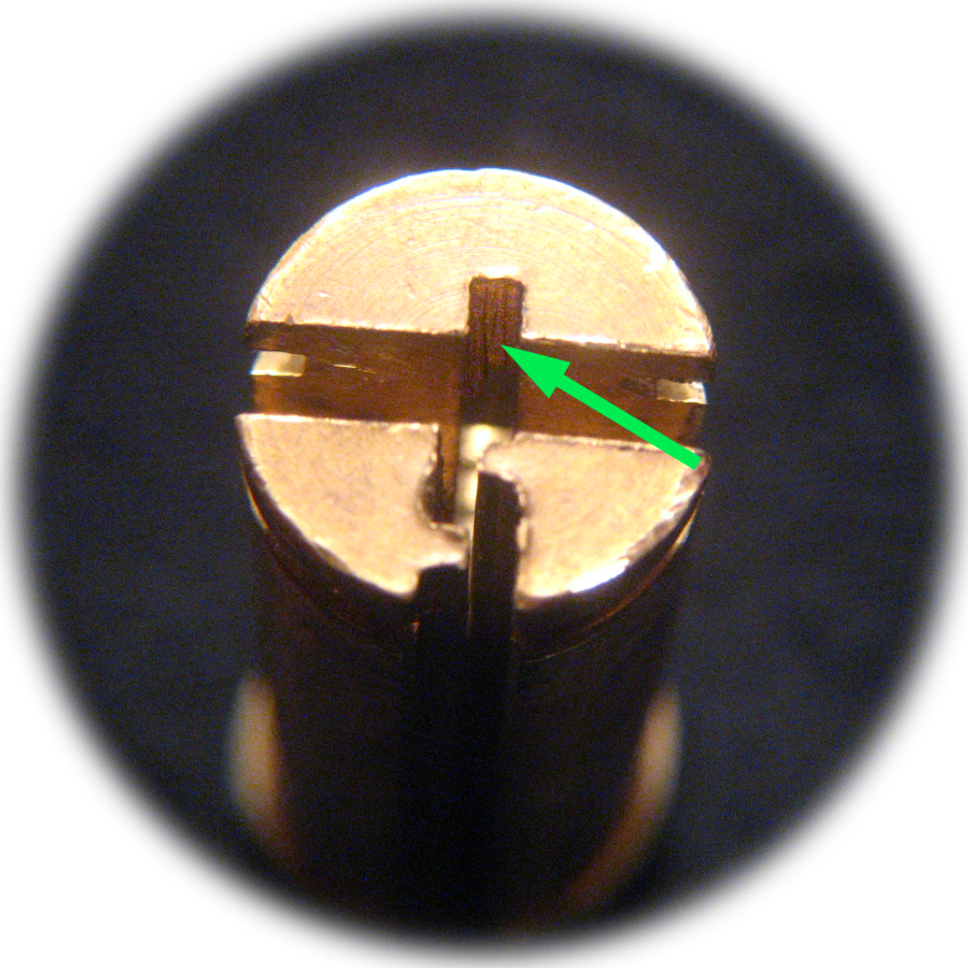


Repeated Snap Marks

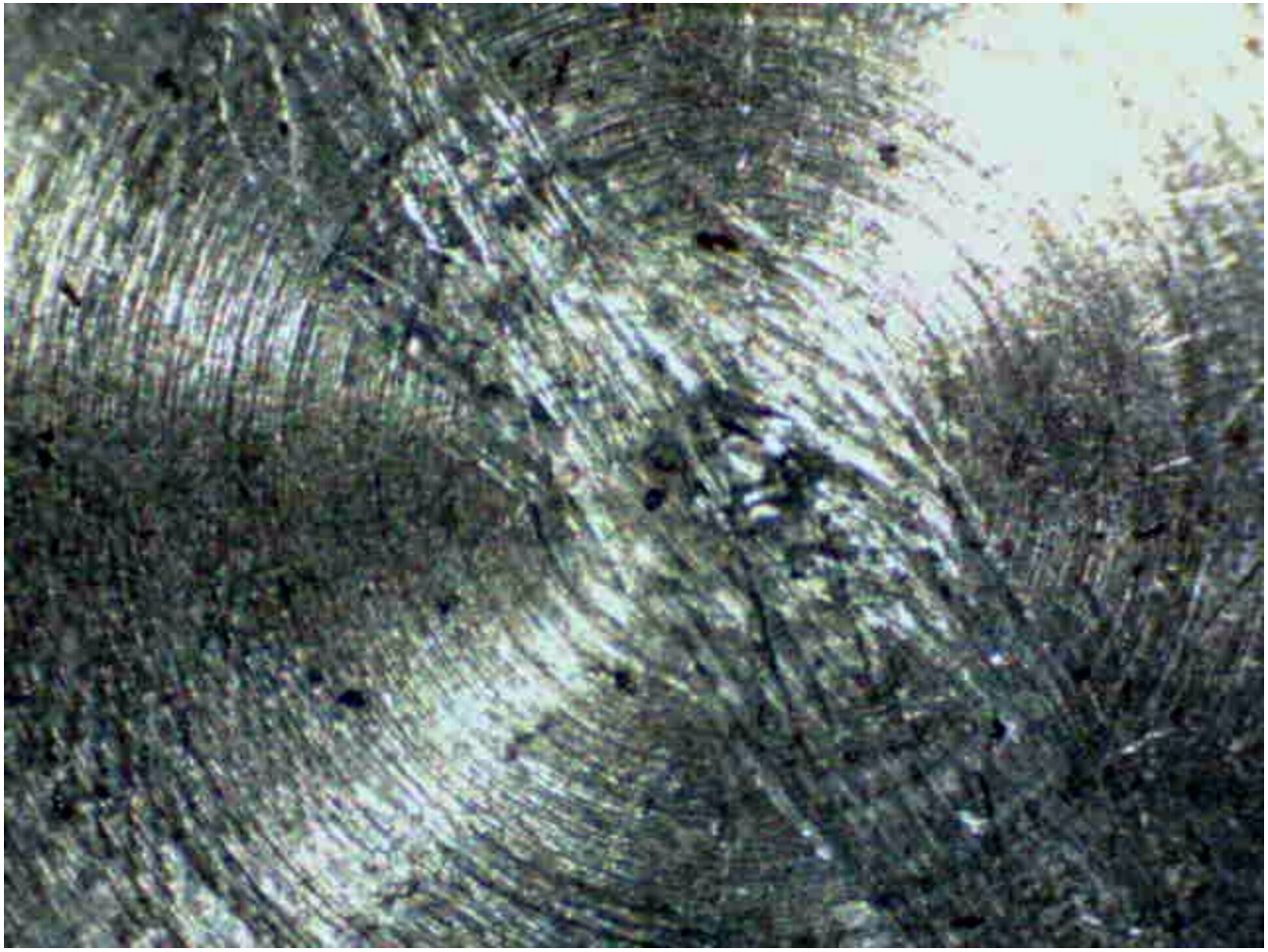
Some People Poke Too Deep



Tools Too Deep – Marks in Rear Top of Keyway

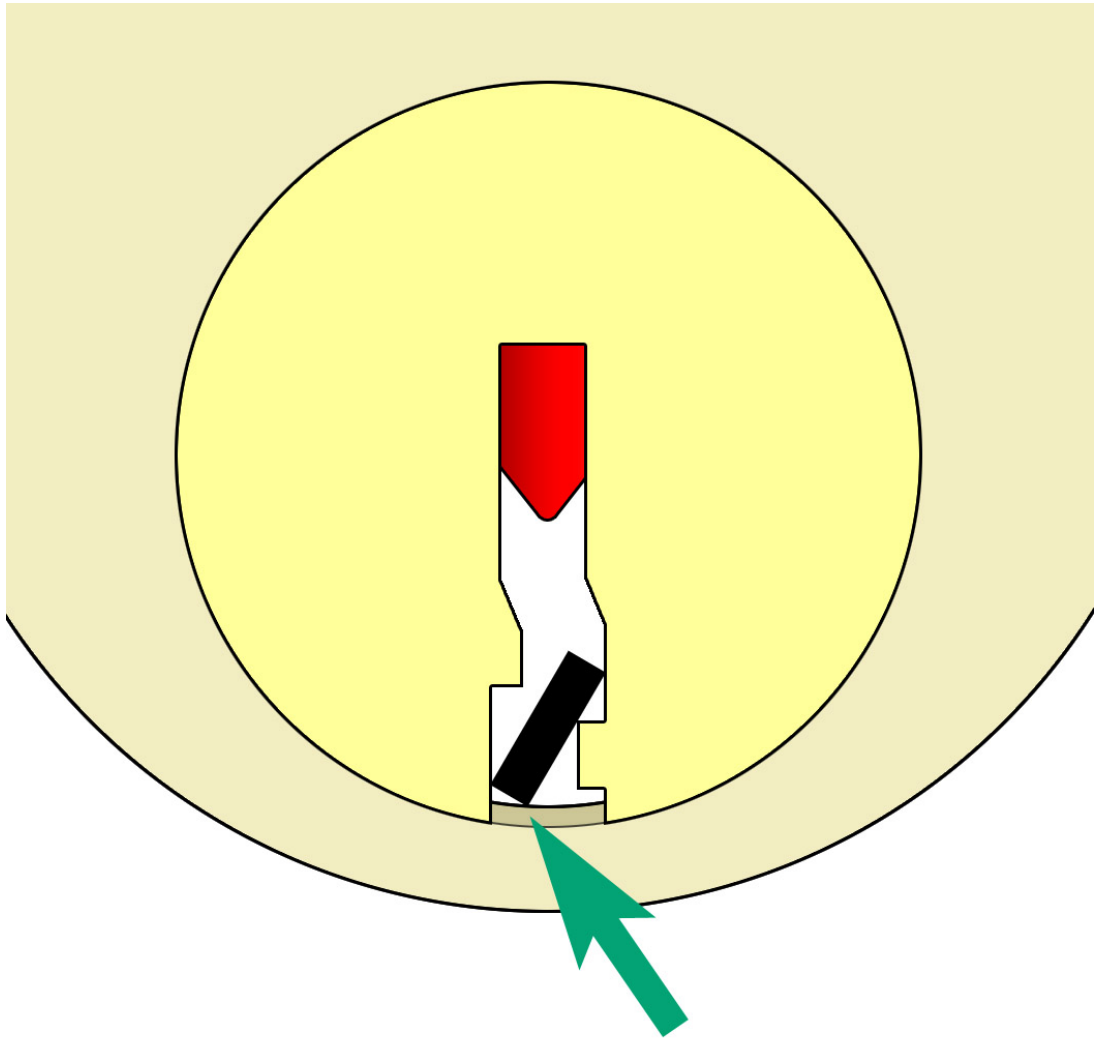


Tools in Too Deep – Marks on Tail Cap

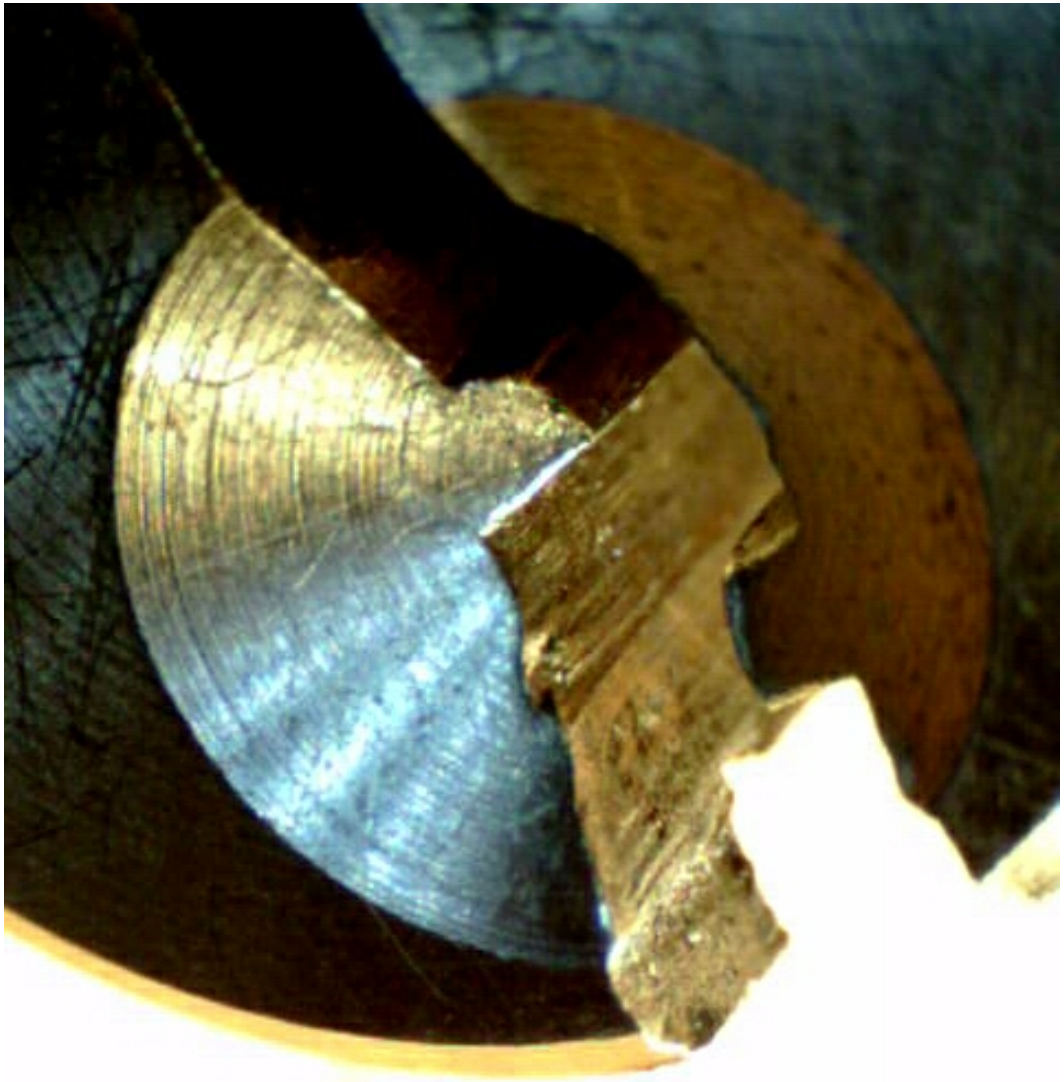


Tension Tools in the Keyway

Tension Tools can "Pinch" the Keyway



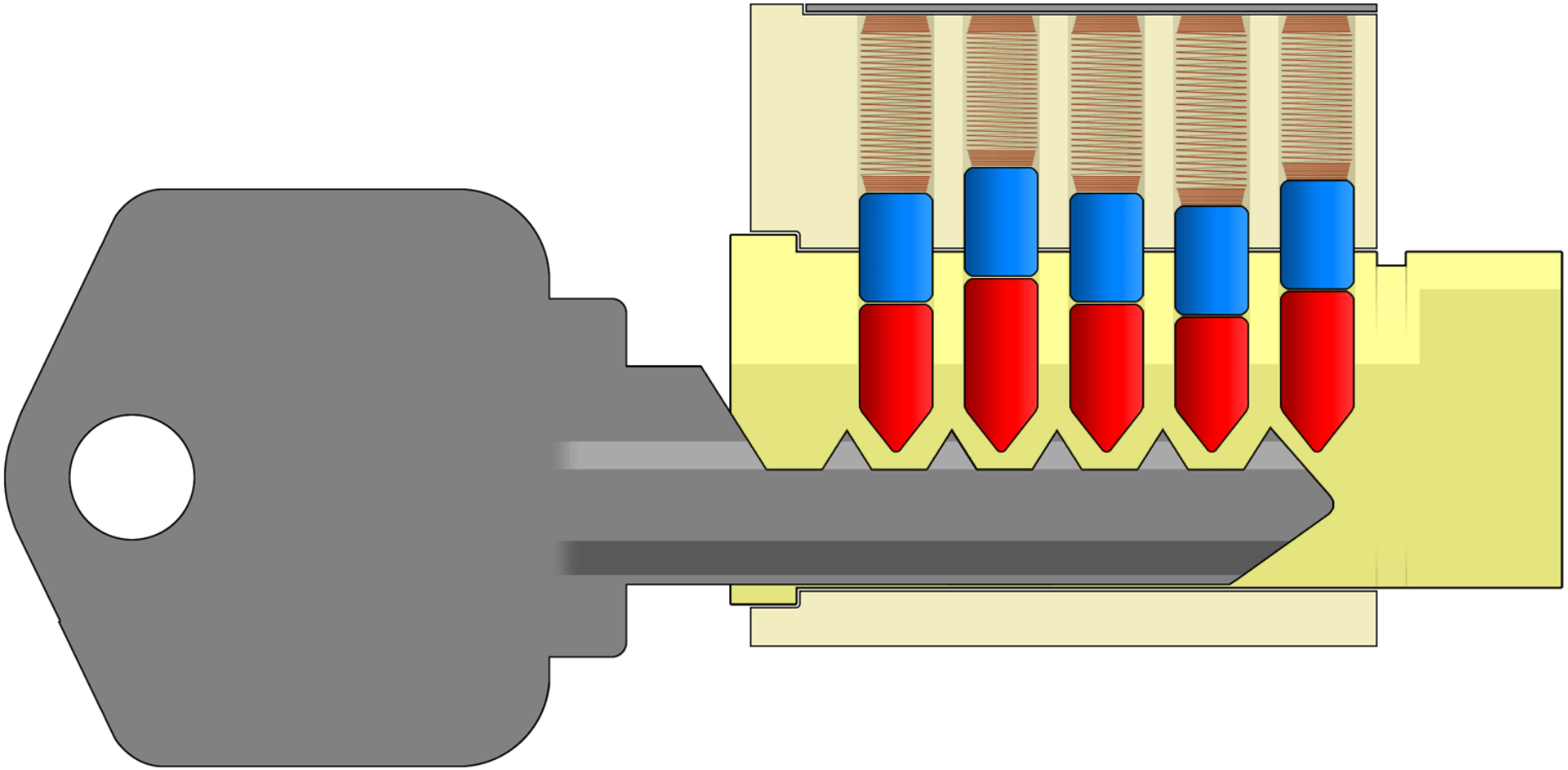
Tension Tools can "Pinch" the Keyway



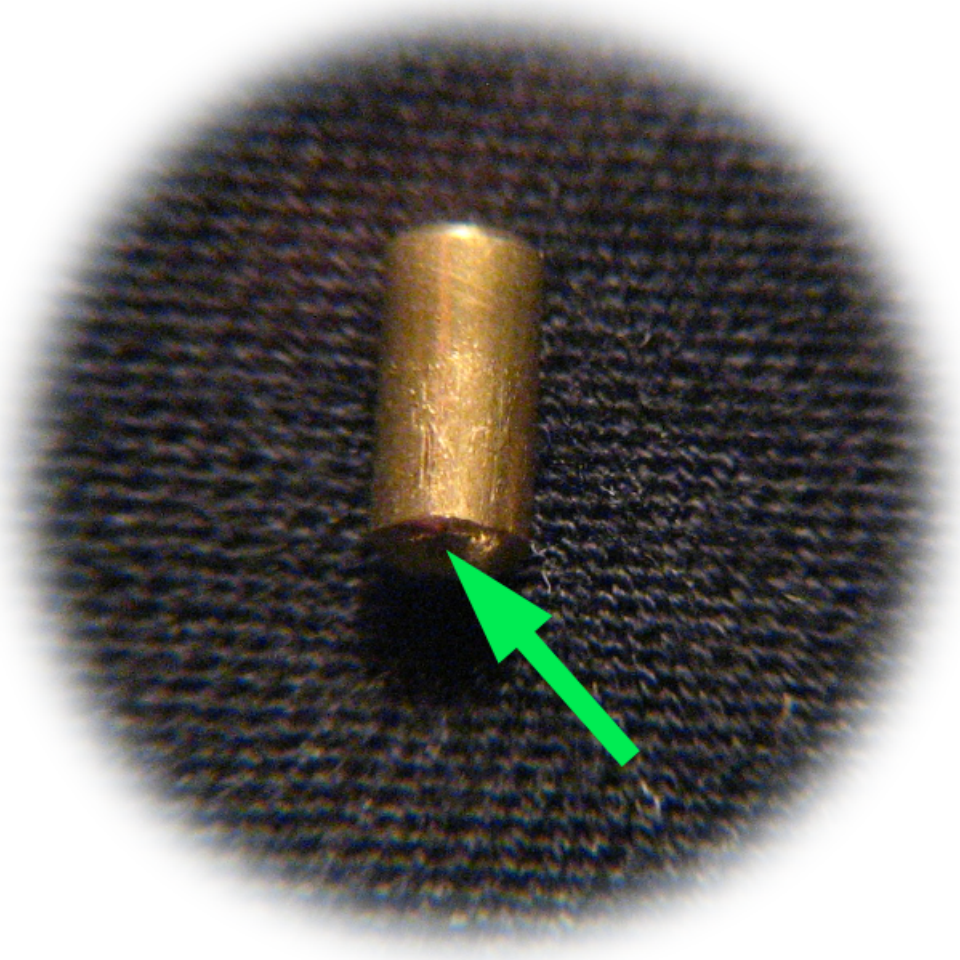
Fraudulent Toolmarks

Fraudulent Toolmarks

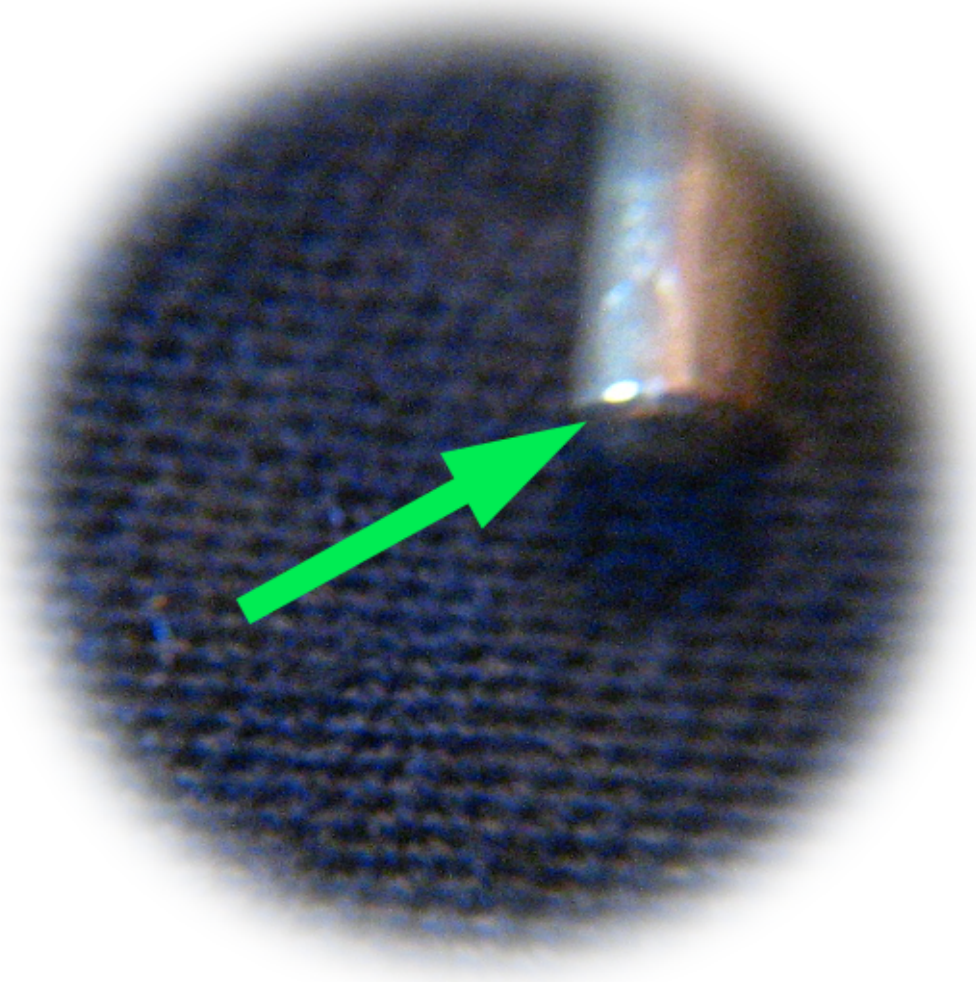
Bump Key Forensics



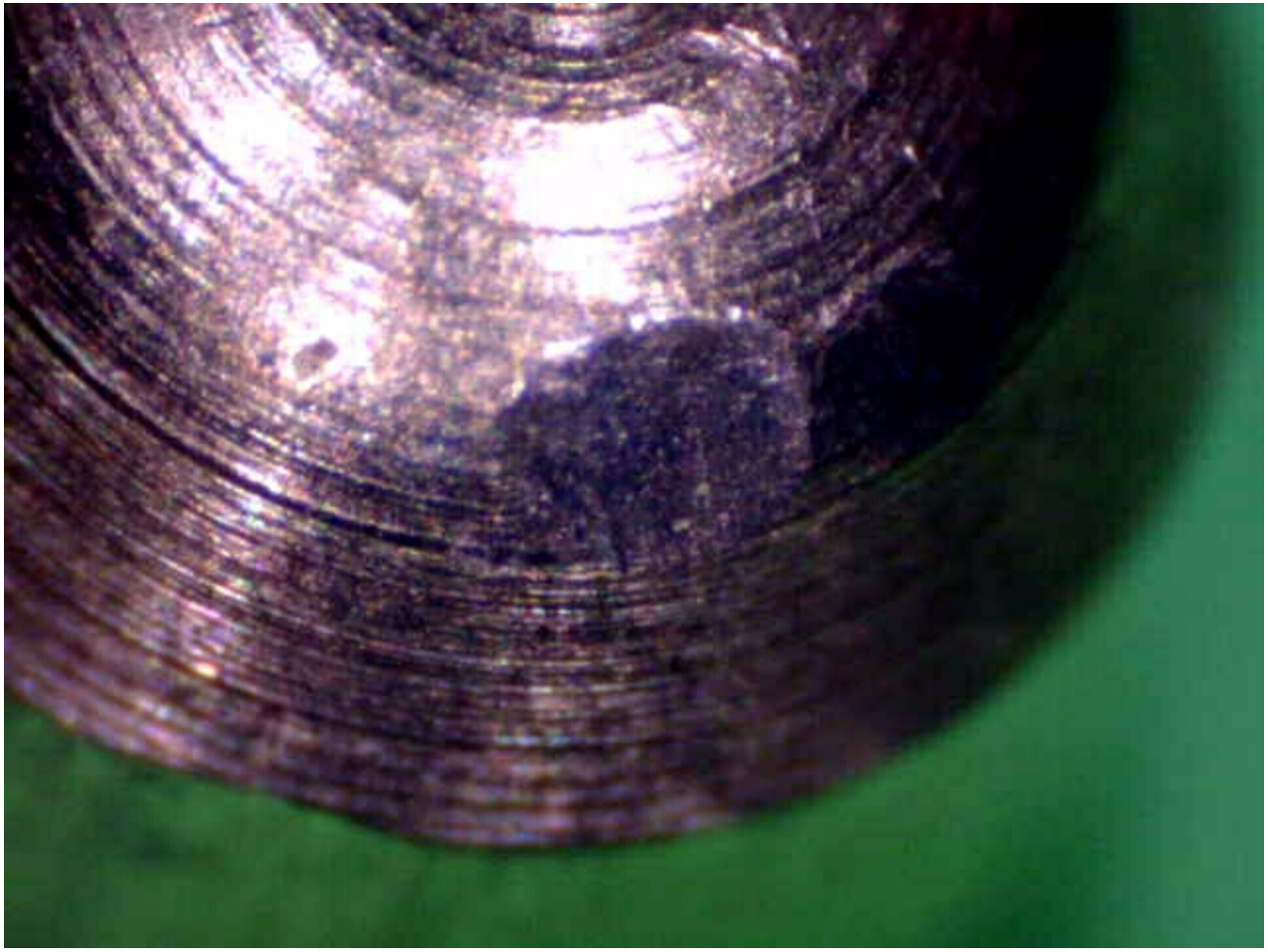
Bump Key Forensics



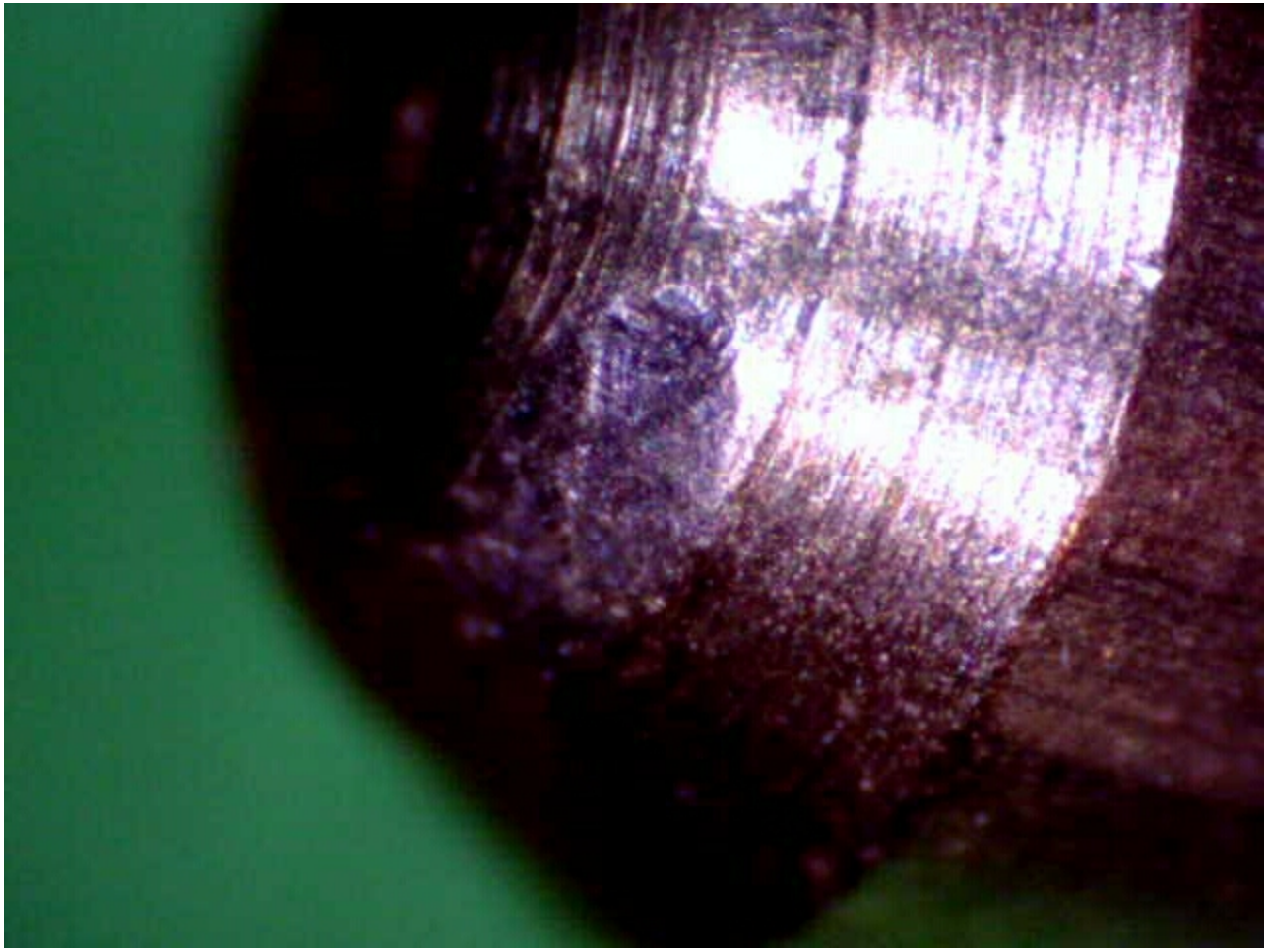
Bump Key Forensics



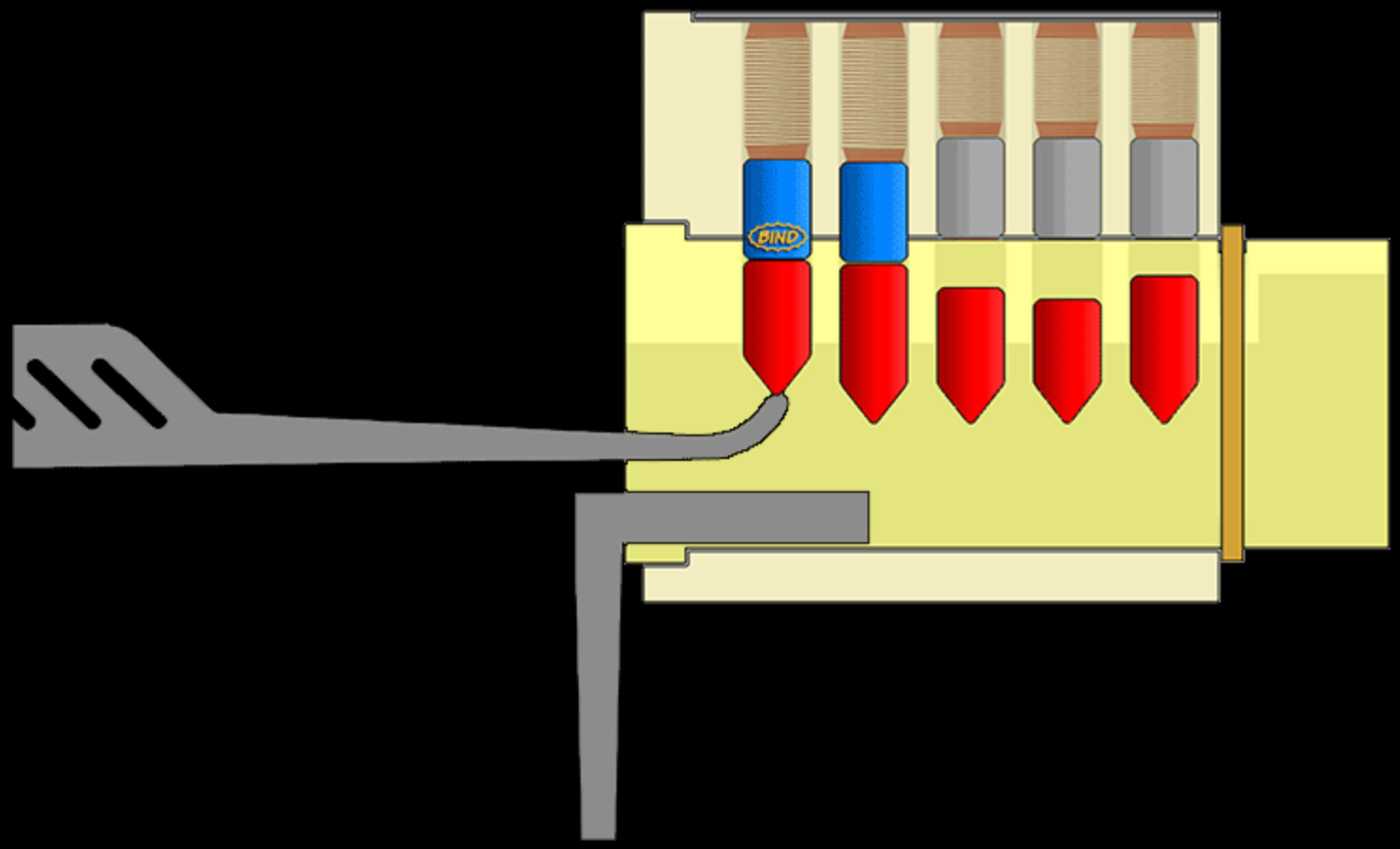
Bump Key Forensics



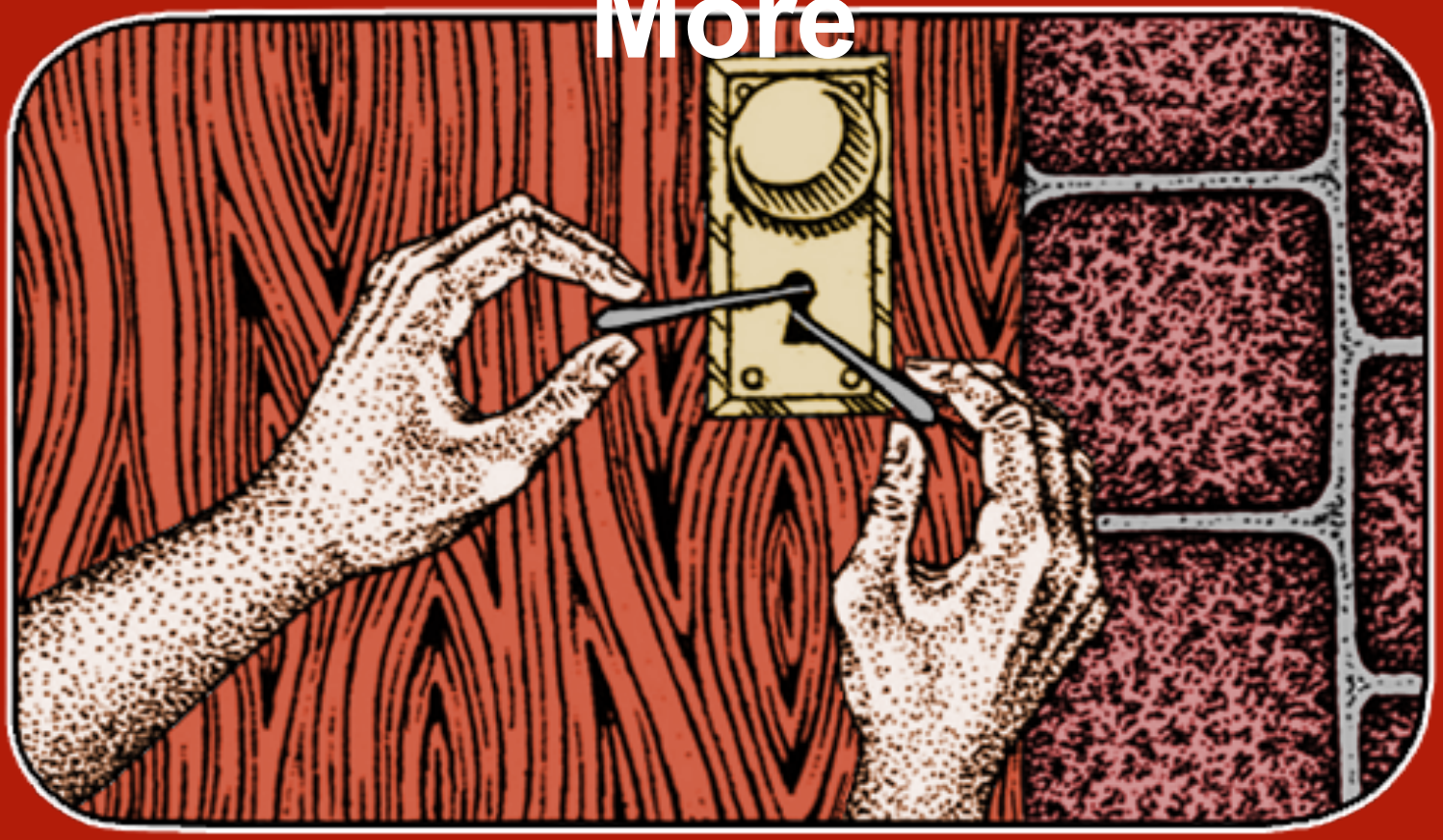
Bump Key Forensics



Questions?

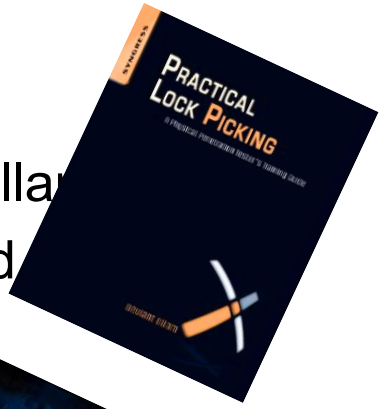


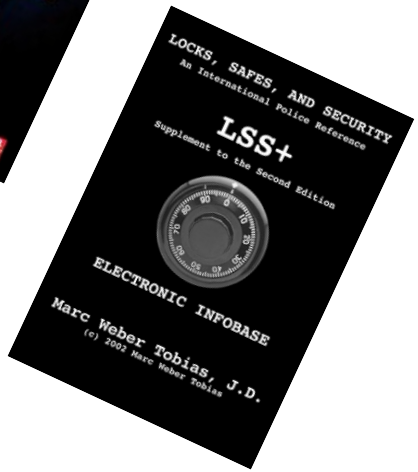
Resources for Learning More



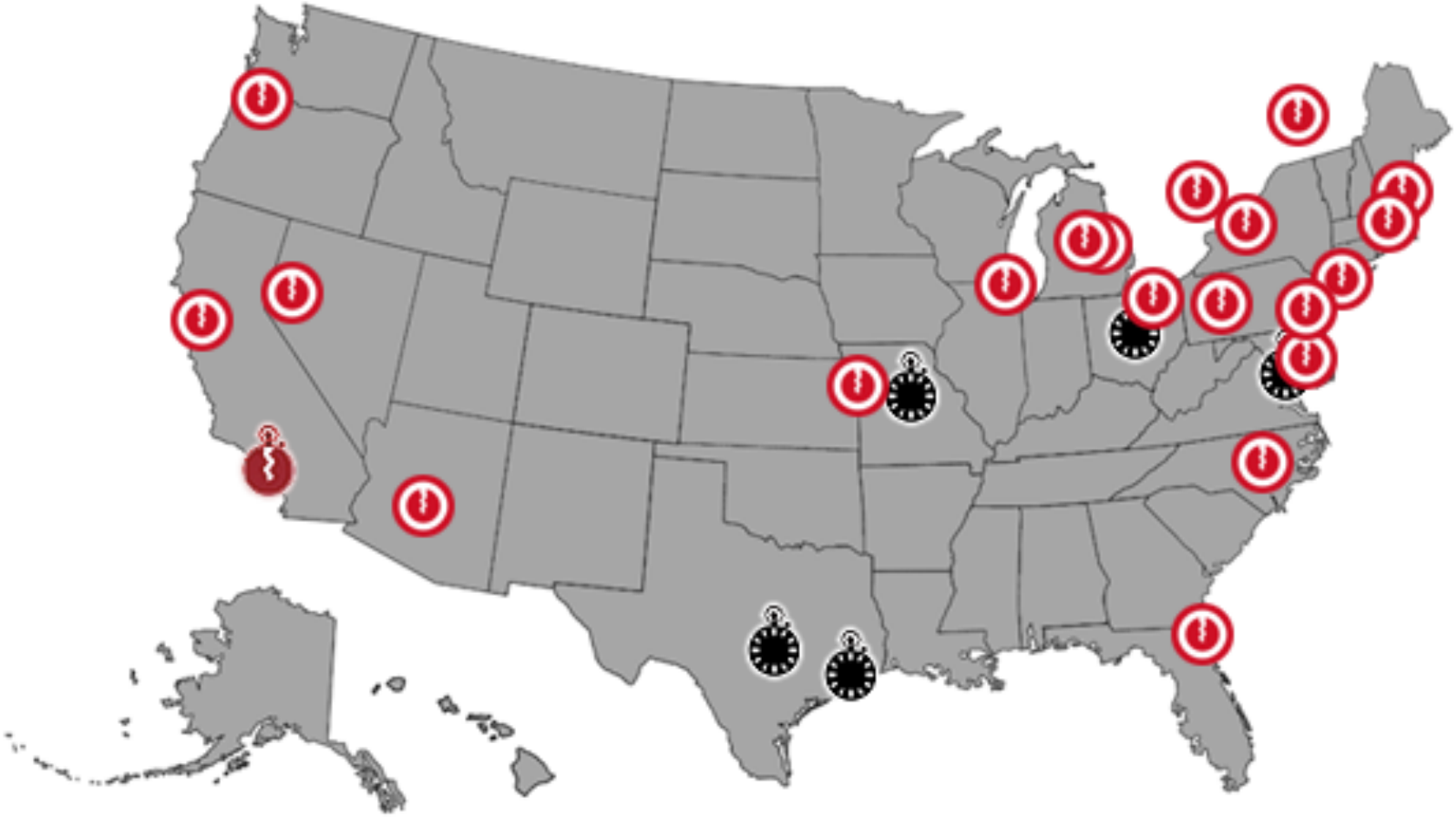
Resources For Learning More

- Books
  - ***Practical Lock Picking & other books*** by Deviant Olla
  - ***High Security Mechanical Locks*** by Graham Pulford
  - ***Locks, Safes, & Security*** by Marc Tobias
- Videos
  - YouTube & Google
  - http://connect.waag.org/toool
  - http://deviating.net/lockpicking/videos.htm
- On The Web
  - http://toool.us – http://toool.nl
  - http://blackbag.nl – http://deviating.net





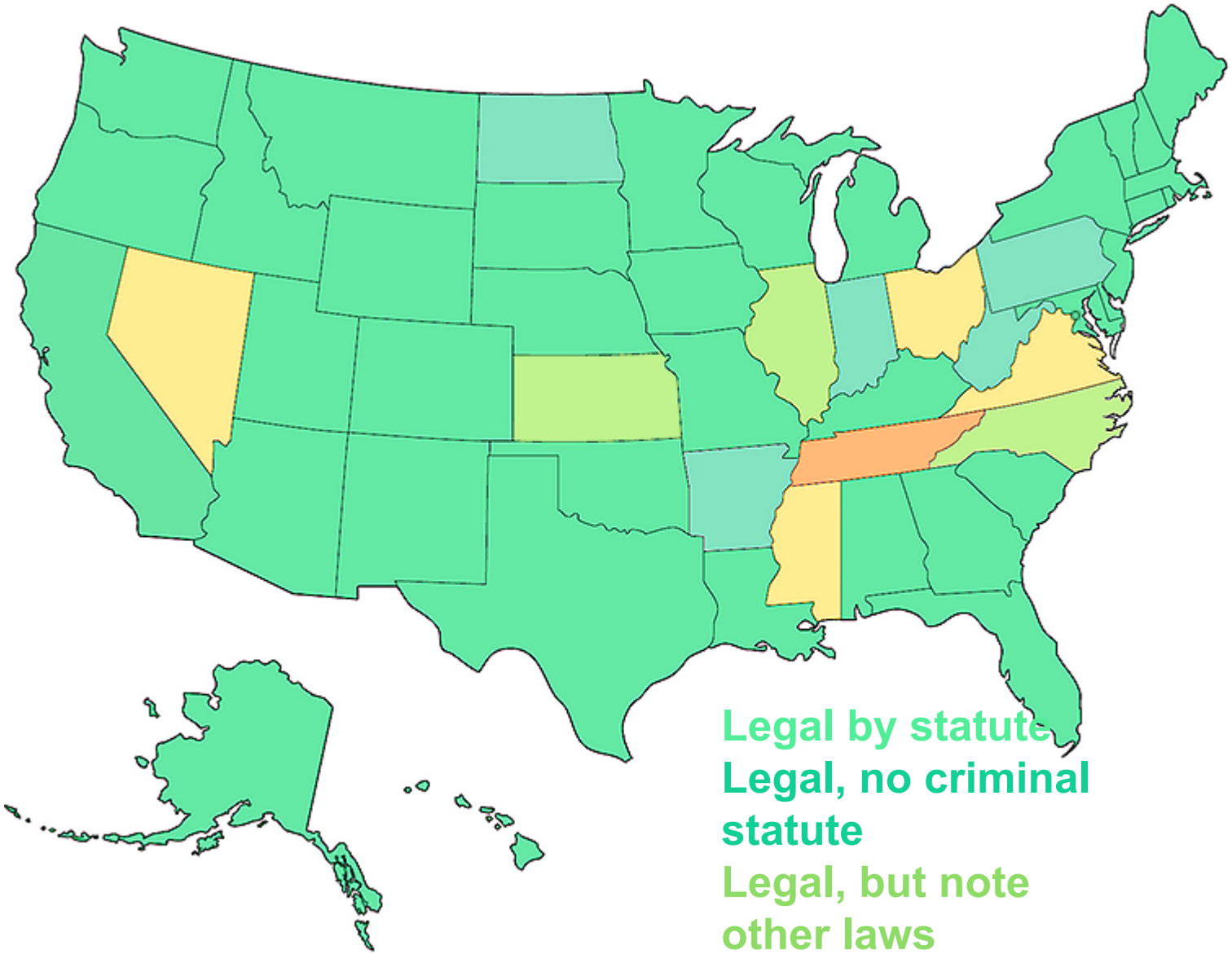
Resources For Learning More



Legal Questions

- We are not lawyers
- Purchase/Shipping through mail
  - Lock manufacturer
  - Auto dealer
  - Law enforcement
  - Repo man
  - Bona fide locksmith
- Possession & use
  - Burglary tools statutes
  - During an illegal act

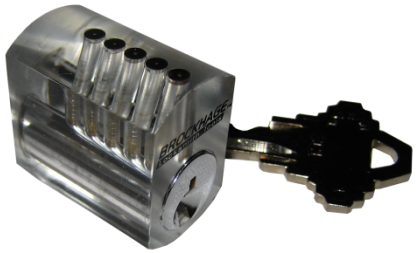
Legal Questions



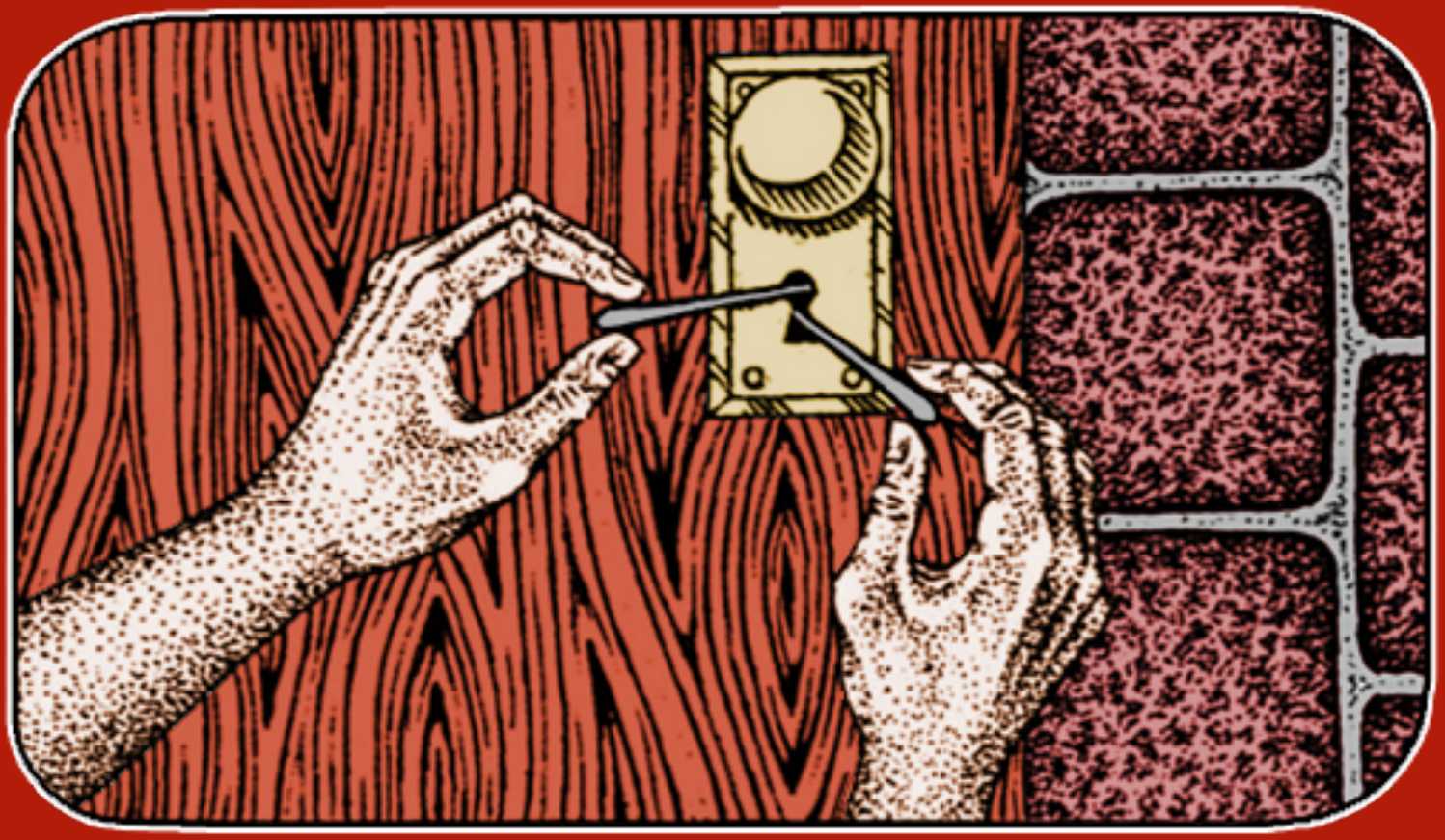
Legal by statute
Legal, no criminal statute
Legal, but note other laws
Prima Facie clause
Picks are more

Acquiring Locks

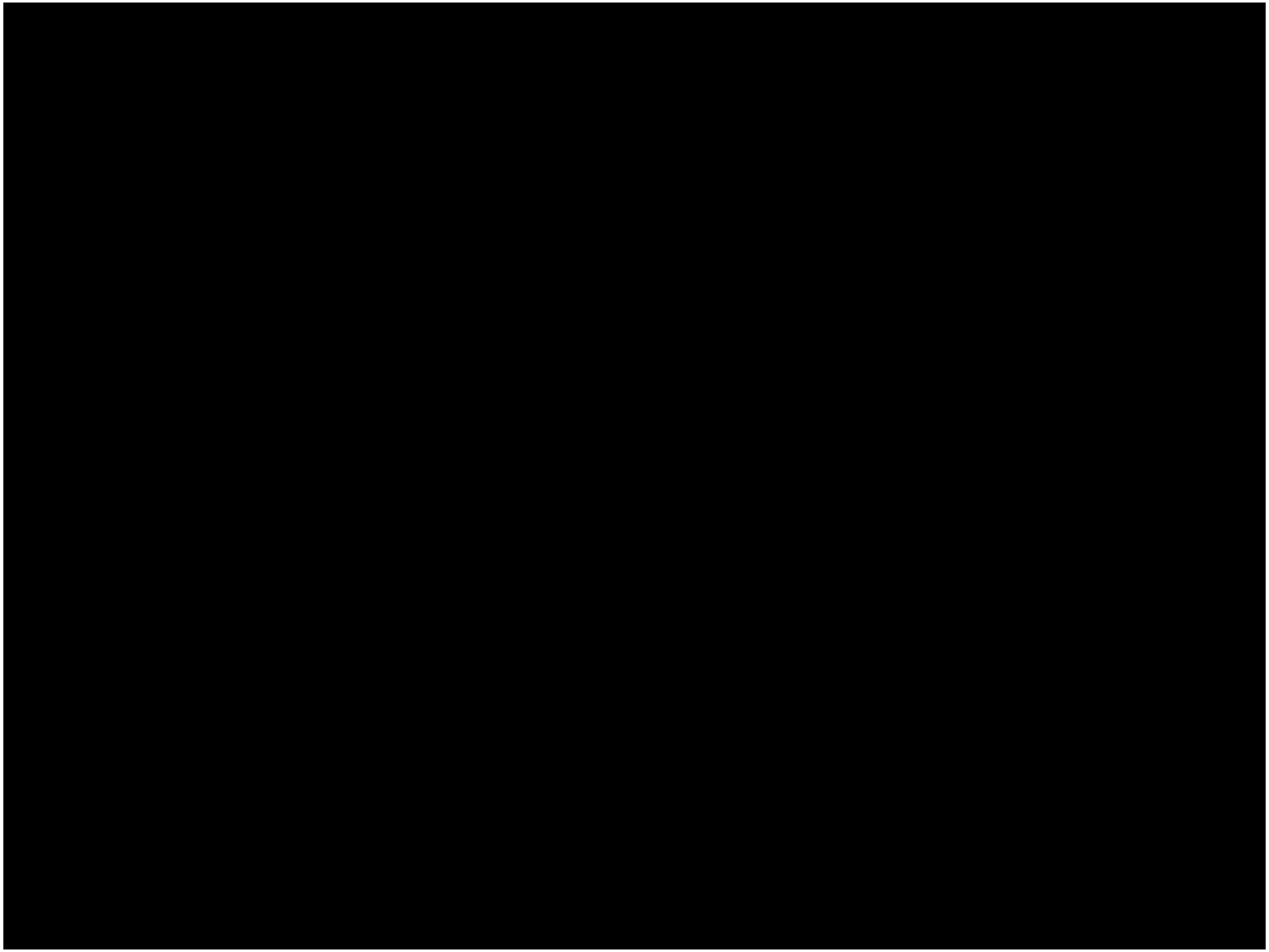
- Free
  - Basements, garages, yard sales
  - Ask neighbors, ask locksmiths
- For sale
  - Vary your sources
  - Hardware store vs. eBay
- Specialized
  - Progressive kits
  - Ultimate practice lock



Security in the Real World



Security in the Real World



Security in the Real World

Security in the Real World

Security in the Real World

- Technical Finesse or Brute F
  - $100 lock in a $10 door?
- Doors
  - Solid core, heavy hinge
  - Anti-thrust bolts and latches
- Windows
  - Shatterproof film
  - Vulnerable to lifting? (sliding g

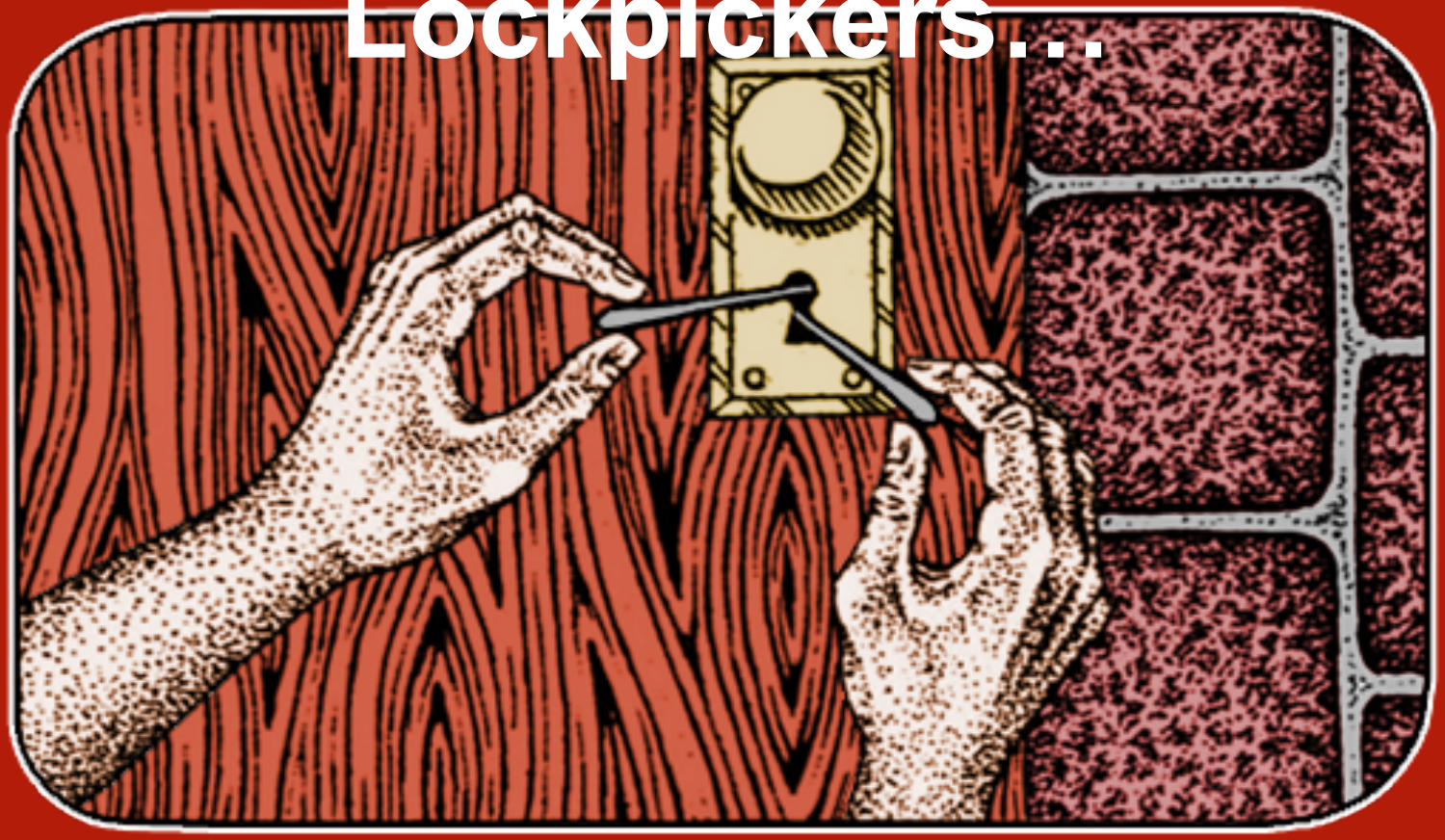
Security in the Real World

Lockpicking

Quick & Dirty ← ***guard against these attacks***

Covert & High-Tech

What People Think About Lockpickers…



Some People Think We Are Shady…

…But We Are Regular Folks

Young and Old…

…Men and Women

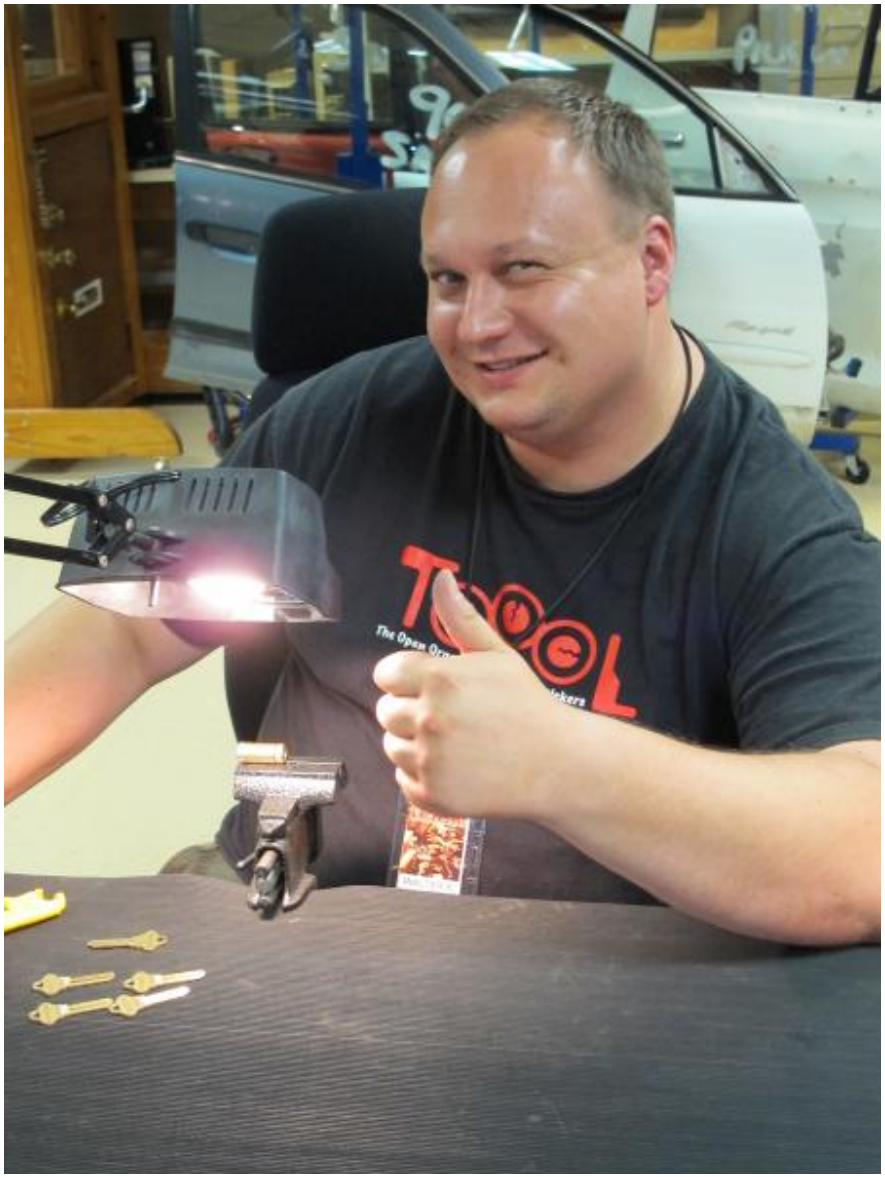
We Like Working With Our Hands…

…And Learning New Things

It's Healthy Competition

Where The Fastest Time Wins

Thank You For Listening



Thank You Very Much

http://toool.us

info@toool.us

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